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MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

BRUCE-CHWATT, L. J. **Congenital Malaria.** [Correspondence.] *Brit. Med. J.* 1957, Sept. 28, 764.

This correspondent refers to ATKINS's letter regarding congenital malaria in Nigeria [this *Bulletin*, 1957, v. 54, 1285]. He also refers to the review of the subject by COVELL [*ibid.*, 1950, v. 47, 1147] who recorded only 0·03% of congenital infections in 5,324 deliveries in various parts of Africa. It would seem therefore that transplacental transmission of malaria from mother to child is very rare in indigenous people who have a substantial degree of tolerance to the parasite, even though placental infections with malaria are common (up to 50%–74%) in African women. In Bruce-Chwatt's own experience in Lagos heavy *P. falciparum* infections were found in 22% of placentae from 567 deliveries but malaria parasites were found in the peripheral blood of only one newborn baby, and even this case was open to doubt [*ibid.*, 1953, v. 50, 596].

These frequent heavy infections of the maternal side of the placenta may be a source of error when the incidence of true congenital malaria is being assessed: this condition is defined as " a transplacental infection of the newborn, confirmed within 24 hours after birth by finding parasites in the peripheral blood ".

" On the other hand, congenital malaria is not uncommon in non-immune persons and may be a real hazard to a baby born of an expatriate mother unprotected by antimalarial drugs. Bruce-Chwatt confirms the beneficial effect of giving prophylactic antimalarial drugs to expectant mothers in the last few months of pregnancy, irrespective of the degree of tolerance possessed by those mothers. *H. J. O'D. Burke-Gaffney*

Lacan, A. Indices paludométriques et immunité palustre chez l'enfant africain. [**Malariometric Indices and Immunity to Malaria in African Children**] *Bull. Soc. Path. Exot.* 1957, Mar.–Apr., v. 50, No. 2, 302–8, 1 graph.

A close study has been made of spleen, parasite and gametocyte rates in children from birth to 10 years old. At different times of year, in forest and savannah areas of French Equatorial Africa, malaria is constantly hyperendemic by the standard of child spleen rate of over 50%, and the conclusions of the paper apply therefore all over the country. [It seems as probable that malaria is holoendemic.]

Intra-uterine malarial infection, leading to abortion or premature birth, is known. A feeble passive congenital immunity may exist, but parasitaemia is known at less than 3 weeks of age, attains 10% to 30% by 3 months and then rises rapidly to its maximum at 6 to 12 months. Thereafter it falls as the spleen rate rises, but shows a second rise with its climax between 2 and 4 years, before declining steadily. Gametocytes make their first appearance at 3 months, and the gametocyte rate increases until 4 to 6 years before declining.

It is concluded that malaria is most dangerous to the infant and to the small child during the weaning period. Also, the child of 3 months to 6 years constitutes the great reservoir of gametocytes. By the age of 6 an active immunity is being organized. It is considered that chemoprophylaxis should be universal from birth to 6 years old, that is, for the pre-school child. It is argued that this will not affect the acquisition of immunity, since infection is equally frequent, and the synthetic drugs destroy the parasites without interfering with their antigenic effects. Pregnant women also should receive chemoprophylactics.

B. B. Waddy

Wu, Y. T. **Observations of Malaria Incidence in the Aboriginal Regions of Central Taiwan in the Preoperational Period of the Current Island-Wide Residual Insecticide Spraying.** *J. Formosan Med. Ass.* 1956, Oct., v. 55, No. 10, 494–501.

The aboriginal region of Taiwan has an area of 3,786 square kilometres and a population of 20,000. Malaria endemicity was studied by examination of approximately 1,000 schoolchildren, drawn from several areas. The spleen rate was constantly over 50%; the parasite rate varied from 3·27% to 31·67%. Out of 130 positive bloods, 66 showed *P. falciparum*, 55 *P. vivax*, 6 *P. malariae* and 3 mixed infections.

Epidemiological observations were made on the children of three villages totalling 1,300 population, for a year. The procedure was (1) quarterly spleen surveys on the 150 schoolchildren; positive percentages ranged from 71·21 to 86·67 seasonally. (2) Monthly parasite surveys on the same schoolchildren; positive percentages ranged seasonally from 8·33 to 31·08, and gametocyte rate from 6·59 to 16·87.

(3) Infant parasite rate, on 56 infants, ranged from 0 to 16·67%. There were peaks of malaria incidence in June and December.

A mosquito investigation was done also. *A. minimus* was " undoubtedly the most important vector ", followed by *A. hyr. sinensis*. 6 other species of *Anopheles* were found, *A. annularis*, *A. maculatus*, *A. tesscllatus*, *A. candidiensis*, *A. splendidus* and *A. ludlowi*.

B. B. Waddy

Wu, Y. T. & Chuang, C. H. **Correlated Data between the Palpable Spleens and Parasites in Malaria.** *J. Formosan Med. Ass.* 1956, Nov., v. 55, No. 11, 541–7.

The authors have attempted a statistical study on correlation between palpable spleens and positive malarial blood infections in 90,336 school-children in Taiwan. The data obtained indicate that from spleen size 0 to 3 the parasite rate increases as the spleen enlarges. No sex difference was observed. The parasite rate in the spleen-positive group was almost 5 times that in the spleen-negative group. For spleen sizes 4 and 5 samples were too small for any significant conclusions to be drawn. In an area previously sprayed with DDT *P. vivax* was rather more common than *P. falciparum*, but where no spraying had been done the latter was commoner. 4 tables give details. *B. B. Waddy*

Peters, W. & Standfast, H. **Report on a Malaria Survey in the Sepik District.** *Med. J. Australia.* 1957, June 22, v. 1, No. 25, 861–8. [17 refs.]

The Sepik District is in the north-west corner of New Guinea and is notorious for the severity of malaria endemic there and for the high mosquito density, especially along the Sepik River flats. Temperatures vary little with season and average about 95°F. maximum and 78°F. minimum; the average annual rainfall is 80 to 90 inches distributed throughout the year. As a preliminary to the pilot project for malaria control by residual spraying in this area, a clinical and entomological survey was made which comprised the examination of spleens and blood and a collection of larval mosquitoes. The persons examined, of both sexes, numbered about 800 of whom 70% were under the age of 20. The malariometric data are tabulated according to 4 localities and 6 age-groups, 5 of which relate to persons under 20. Spleen rates were above 75% in all age-groups under 20 and were between 90% and 100% below the age of 4 years, tending to decrease thereafter. Spleen sizes are classified by the Hackett system; an index over 3·0 was common under the age of 4 years. Parasite indices were as high as the spleen rates; parasite densities were estimated in relation to leucocyte counts. Although there was not much variation in the spleen rate and average and enlarged spleen from district to district, for children aged 5–14 years, there was a considerable difference in parasite rates.

Three species of malaria parasite were found to be prevalent: in one locality, for instance, the parasite ratio percentage was as follows:—*P. falciparum*, 12·5%, *P. vivax*, 22·1%, *P. malariae*, 48·1%, and 17·3% doubtful in the over-20 age-group; in the under-2 age-group for the same area the figures were respectively 45·2%, 25·8%, 25·8% and 3·2%. In the same area for the under-2 and 2–4 age-groups the gametocyte rates for all blood samples were 50% and 34% respectively; an average of 18·4% of all blood samples for all age-groups is quite high. Gametocytes were present in about one-third of all infections in each of the species.

The infant parasite rate gives a very sensitive index of the degree of transmission in a community; it was about 80–83% in the villages with a 33·3% gametocyte rate.

Adult mosquito catches showed *Anopheles punctulatus* and *A. koliensis* to be dominant inland; *A. farauti* was by far the commonest species on the coast where it is a facultative breeder in brackish water, and has abundant opportunity for breeding in the extensive mangrove swamps and brackish lagoons of the coastal belt. The Sepik plain area forms an extensive breeding ground for *Taeniorhynchus* (*Mansonioides*) *uniformis*, which breeds in enormous numbers and is a pest to the inhabitants at all times of the day and night. Of the blood films taken in the daytime in one area 8% contained microfilariae of *Wuchereria bancrofti*.

Perhaps the outstanding features of this survey are the distribution of the 3 malaria parasites in all age-groups and the comparatively high gametocyte rates. More information is required about the habits of the adult anopheline mosquito such as the frequency of its biting man and frequency and period of stay in human dwellings. Further investigations are proposed on the lines laid down by Macdonald, and Davidson and Draper [this *Bulletin*, 1950, v. 47, 907, 915; 1952, v. 49, 569, 813; 1954, v. 51, 456]. *R. Ford Tredre*

Spudis, V. K. [**Epidemiological Causes of the Spread of Malaria in Volga-Aktubinsk Flood Plains**] *Med. Parasit. & Parasitic Dis.* Moscow. 1957, v. 26, No. 4, 423–6. [In Russian.]

The English summary appended to the paper is as follows:—

"Observations were made in the 'Stakhanovetz' kolkhoz of Central Aktyubinsk region in the Stalingrad district. It was revealed that the contact of the human being with malarial mosquitoes and malarial infection takes place in majority of cases within the borders of the village.

"Reaction of precipitation which was carried out with serums of man and various domestic animals (such as cattle, pigs, horses) showed that malarial mosquitoes suck the blood of both man and animals. The percentage of positive results was nearly equal for man and animals, i.e. in man it constituted 21–36·7%, in cattle 36–42·2%, in pigs 25–29·4%, in horses 17·6–26·6%. It shows that the degree of sucking of blood of men and of domestic animals by malaria mosquitoes is almost the same."

Reid, E. T. & Woods, R. W. **Anopheline Mosquitoes of Southern Rhodesia: a General Survey.** Reprinted from *Proc. & Trans. Rhodesia Scientific Ass.* 1957, v. 45, 47–72, 24 figs. [27 refs.]

"A checklist of Southern Rhodesian Anophelines is given; so far 28 species and nine varieties have been recorded. The distribution of the species is discussed and maps are given. Notes on habitats of larvae and adults and dissection data of adults are supplied in tables, and in the text.

"The two most important vectors of *Plasmodium falciparum*, the most widespread malaria parasite, are *funestus*, an endemic transmitter, and *gambiae* which carries epidemic malaria. Infection rates in other species are noted.

"The seasonal incidence of mosquitoes from collection records indicate that the stream breeders show little seasonal change in numbers, but that species which breed mainly in pools show great variations in abundance, they are most plentiful in February and March. Malaria incidence is closely correlated with that of *gambiae*.

"A decrease in numbers of *funestus* and an increase in *gambiae* numbers occurred between 1926 and 1948; the reasons are not clear. *A. gambiae* distribution shows an annual advance to higher areas with increases of temperature and a regression to lower altitudes with the advent of winter. Distinct colour variations in the wing patterns of *funestus* are mentioned; variations also occur in *gambiae* and *rufipes*.

"Control measures carried out against malaria mosquitoes are discussed. Residual control with BHC wettable powder is now used over wide areas of the country with marked effects on malaria incidence."

Colless, D. H. **Further Notes on the Systematics of the** *Anopheles leucosphyrus* **Group (Diptera: Culicidae).** *Proc. Roy. Entom. Soc. of London.* Ser. B. 1957, Aug. 23, v. 26, Pts. 7/8, 131–9.

Veloso, H. P., de Moura, J. V. & Klein, R. M. Delimitação ecológica dos anofelíneos do subgênero *Kerteszia* na região costeira do sul do Brasil. [**Ecological Delimitation of** *Kerteszia* **Mosquitoes in the Coastal Regions of Southern Brazil**] *Mem. Inst. Oswaldo Cruz.* 1956, Dec., v. 54, No. 3, 517–47, 3 maps, 6 graphs & 7 pls. English summary.

This is a sequel and extension of survey investigations described in a previous paper [this *Bulletin*, 1957, v. 54, 262], and is presented in similar form. The region considered here extends along the seaboard of southern Brazil from the southerly extremity of Paraná, through Santa Catarina, and into Rio Grande do Sul. 35 field stations were set up in 14 different municipalities, their locations being shown in map 1.

The vegetation of the area of study is given in map 2, and comprised the following groups: (1) a narrow coastal region, without extensive

forest, vegetation being confined to isolated patches; (2) forest situated on level ground (on quaternary rocks), forming a belt lying alongside (1) and extending inland into (3) below; vegetation and its associated microclimates were uniform; (3) forest on rocky ground inland, where the vegetation was very variable, in association with the topography, and which constituted more than half the area investigated.

The flora of the forest regions is tabulated by species in relation to constancy, frequency and abundance (tables I to V, representing 5 biological groupings). These aspects are also shown as histograms (graphs 1 and 5). The abundance of breeding places in bromeliads (also in histogram form) is given by plant species for the 3 vegetation regions (graph 6).

The geographical distribution of the 3 vector species is shown in map 3, and the occurrence of these species in the 3 vegetation regions in graph 2 (percentage per species of total for all 3 species). *Anopheles* (*Kertezia*) *cruzii* showed numerical preponderance in all vegetation regions over the other 2 species, which were about equal in number. Peak distribution occurred in vegetation region (1) above for *A.* (*K.*) *bellator*, in (2) for *A.* (*K.*) *cruzii*, and in (3) for *A.* (*K.*) *homunculus*. *A.* (*K.*) *cruzii* and *A.* (*K.*) *bellator* were represented in all vegetation regions, but *A.* (*K.*) *homunculus* occurred in only (2) and (3).

A quantitative index, based upon the MK index [*loc. cit.*], was correlated with the volume of water occurring in the biotopes (graph 3). A markedly predominant value occurred in vegetation group (1), its peak occurring at about 300 ml. of water, with a rapid decline at increasing volumes. The values of this index were similar for breeding places in vegetation group (2) as compared with (3), but both were much lower than in (1). When correlated with altitude of the biotopes (graph 4), the quantitative index showed a rapid decline above about $2\frac{1}{2}$ metres in vegetation groups (1) and (2). At about $7\frac{1}{2}$ metres, the value of the quantitative index in groups (1) and (2) approximated to that in group (3), which was consistently low at all altitudes.

[The paper consists almost entirely of tabulated data, the scope of which is indicated above; the short text is explanatory. Plates 1 to 7 illustrate the topography and vegetation of the region, together with selected species of Bromeliaceae encountered.] *N. R. Phillips*

Schneider, J., Languillon, J. & Delas, A. Association chloroquine/pyriméthamine dans la chimioprophylaxie du paludisme. Premiers résultats. [**Chloroquine-Pyrimethamine Combination in the Prophylaxis of Malaria**] *Bull. Soc. Path. Exot.* 1957, Mar.–Apr., v. 50, No. 2, 295–302.

In a previous communication [this *Bulletin*, 1955, v. 52, 872] the results achieved in the treatment of malaria by combined administration of chloroquine and pyrimethamine were recorded. It was shown by tests

on mice infected with *Plasmodium berghei* and on human subjects infected with *P. vivax* and *P. falciparum* that the simultaneous administration of half the minimum effective dose of each of the two drugs produced a schizontocidal effect equal to that obtained by the minimal effective dose of either of them.

At the Malaria Conference held at Lagos, Nigeria, in 1955 under the auspices of the World Health Organization, it was suggested that a similar combination of the two drugs should be tested for chemoprophylaxis of malaria.

Accordingly, two sectors in a hyperendemic zone of the northern Cameroons were selected, the one for a chemoprophylactic trial, the other, 30 km. distant, for a control. No anti-mosquito measures were applied in either of the two sectors. The subjects of the experiment were children below the age of 9 years. In the treated sector, 250 of these were placed on chemoprophylaxis.

Tablets had been prepared each containing 150 mgm. of chloroquine base and 12·5 mgm. of pyrimethamine, representing for each drug half the minimum effective adult dose. Each child received half a tablet (*i.e.* 75 mgm. of chloroquine base and 6·25 mgm. of pyrimethamine) once a week from April 12 to September 30, 1956.

In the control sector the spleen and parasite indices showed no significant change in level during the period of the experiment. In the treated sector there was a dramatic fall in the spleen index from 71% on April 12 to 4% on July 30 and in the parasite index from 67% to zero. After this, however, both figures showed a progressive rise till by September 30 the spleen index had reached 12% and the parasite index 27%.

It was evident that either the dosage used was insufficient or that one or both of the products had begun to lose activity. To resolve the problem the children in the treated sector were divided into 3 groups. The first continued to receive the same dosage as before. The second received 25 mgm. of pyrimethamine only, once each week, a dose considered sufficient for an adult, and 4 times as great as that previously given. The third group received 300 mgm. of chloroquine base only, once each week, an amount equal to the adult dose and 4 times as great as that previously given.

During the succeeding months in the first two groups the spleen and parasite indices at first continued to rise, while in the third group both showed a dramatic fall.

It was therefore concluded that during the first part of the experiment the two drugs had acted as adjuvants to one another as in the therapeutic trials previously reported; but that during the later months resistance to pyrimethamine on the part of the parasite had developed, thus rendering the combined regimen comparatively ineffective.

It is emphasized that these findings are preliminary; it is intended to publish final conclusions at a later date. *G. Covell*

MACDONALD, G. **Malaria and its Control for Planters and Miners.** Ross Institute Industrial Advisory Committee: Information and Advisory Service. London School of Hygiene and Tropical Medicine. 1957, Mar., Bull. No. 7, 62 pp., frontispiece, 7 figs. & 1 diagram. [Originally issued Nov., 1952, revised Mar., 1953, rewritten Mar., 1957.]

This popular and informative booklet, first produced in 1946 and reproduced several times since [this *Bulletin*, 1953, v. 50, 280], has been rewritten for the present issue. There has been a considerable change in attitude to malaria control since 1953 when this bulletin was last revised, and the present edition will be widely welcomed for its clear and concise statement of the epidemiology and control of malaria in terms understandable by the layman. It has been written primarily for planters and miners and therefore it is didactic in expression of opinion, and procedures are described as in a manual of operation. Considering the small size of the pamphlet this is inevitable and it is acceptable in view of the author's authoritative standing.

Epidemiological factors in malaria are first dealt with, followed by concise descriptions of the epidemiological types of malaria, and of the vectors in various parts of the world, with special reference to their breeding and feeding habits. More than half the booklet is devoted to the principles and practice of control. Although all the main control methods and the conditions under which they may be employed are mentioned, only the use of residual insecticides for adult mosquito control is dealt with at length. This concentration on residual insecticidal control is because experience has shown that this is the most economical and efficient control measure for mines and plantations. Full details for making and applying these preparations and concerning suitable equipment are given, and also advice concerning the protection of control staff. In the section on control of breeding the main emphasis again is on the use of the modern insecticides. There is a brief but excellent discussion of drug prophylaxis outlining the drugs suitable and the conditions under which they would be useful. An important section discusses policies of malaria control, the first referring to national policies and the place of local schemes in these, and the second dealing with the policies of industrial bodies. Terminal appendices in non-technical language contain brief but adequate descriptions of the malaria parasite and the anopheline mosquito.

Although the layout of the pamphlet is unchanged the text has been extensively altered since the last edition in 1953. Dieldrin now has a place among the insecticides and not merely a mention. The sections on spraying procedures and apparatus have been expanded, rules have been laid down for the protection of workers. Anopheline resistance to insecticides is discussed and its effect on control policy. The discussion of drug prophylaxis has been reduced, in keeping with its reduced use in industrial concerns. The booklet succeeds admirably in describing in simple

terms the present outlook on malaria epidemiology and control, and it should prove of value to laymen who have responsibilities in the matter of malaria control and also to many medical workers who wish to keep themselves informed about modern views and techniques in this connexion. *T. H. Davey*

CIUCA, M. *et al.* **Principles and Basic Methods of Malaria "Eradication". Relative Efficiency and Limits of a Single Primary Method of controlling Malaria. Reduction of Malaria Endemicity in the R.P.R. in connection with the Use of Both Primary Antimalarial Measures (1947–1955).** [Abridged Version.] 1957, 118–39 (Malaria Section). Report read at National Congress of Medical Sciences, May 5–11, 1957. Bucharest: Editura Academiei Republicii Populare Romîne.

Nearly a third of Rumania has conditions favourable to malaria transmission. *Anopheles* breeding areas can be differentiated into three zones; the coastal zone, characterized by water rich in minerals; the Danubian flood zone of large, permanent, stagnant lakes; and a higher zone extending along Danube tributaries to the foothills of the Carpathians, in which breeding takes place mainly in temporary flood lakes of more highly oxygenated water.

Before control operations, in the last-mentioned zone all types of *Anopheles maculipennis* were found, often with *A. m. atroparvus* predominating; in the latter's presence the spleen rate might rise to over 70%. In the Danubian zone *A. m. messeae*, an indifferent carrier, predominated and spleen rates were from 9% to 25%. In the coastal zone *A. m. atroparvus* and *A. sacharovi* were found, both efficient carriers, *A. sacharovi* being found infected 7 times as frequently as *A. m. atroparvus*. Malaria was hyperendemic, with occasional severe epidemics.

A. maculipennis hibernates in adult form. Oviposition begins at the end of March, and the first new adults appear between 8th and 25th May. Those of *A. sacharovi* do not appear before June. Altogether there are 5 to 7 generations of adults each summer. The transmission season of *Plasmodium vivax* lasts from 115 to 140 days, according to the year's warmth; that of *P. falciparum* lasts 27 to 44 days in a warm summer.

Chemotherapy and prophylaxis, at first with quinine and later with synthetic antimalarial drugs, and antilarval campaigns with Paris green or oil, had considerable effect in reducing malaria between 1926 and 1940. During the war there was a disastrous increase in malaria, not accurately represented by the existing statistics. This culminated in a *P. falciparum* epidemic in 1946. In the worst area, on the Black Sea coast round the Danube delta, the parasite rate reached 70% locally, over 80% of infections being *P. falciparum*.

A vigorous programme of free distribution of chemoprophylactics, in 1947 and 1948, effectively if temporarily prevented a recurrence of epidemic malaria. In 1949 a network of malaria stations was set up

throughout the endemic area, and an imagicidal campaign with BHC and DDT began. After 4 years morbidity reached a very low level. In zones with great malaria potential, in which sporadic cases continued with comparative frequency, spraying was continued (at least until 1955); in other localities, including many of those at first protected by 100% spraying, since 1952 imagicide action has been confined to "focus disanophelisation", *i.e.* spraying the house in which a malaria case occurs, and the 3 or 4 surrounding houses. Watch is being kept for the appearance of anopheline resistance, not detected as yet.

The aim now is to obtain earlier and more accurate diagnosis of sporadic cases, and to place discovered malarial subjects on a suppressive drug for the rest of the transmission season, until the last person with parasitaemia has been cured. Mention is made of plans for frontier liaison and *Anopheles*-free frontier zones.

This paper is a reference work on malaria in Rumania, giving many geographical and statistical details. There is a long summary in English.

B. B. Waddy

MASTBAUM, O. **Malaria Control in Swaziland. Some Observations during the First Year of Partial Discontinuation of Insecticides.** *J. Trop. Med. & Hyg.* 1957, Aug., v. 60, No. 8, 190–92, 1 map.

Countrywide malaria control in Swaziland was achieved in 1953–54 by the use of BHC as a residual insecticide. 146,000 dwellings were sprayed. *Anopheles funestus funestus* appeared to have vanished, *A. gambiae* was much reduced in numbers and the infant parasite rate had fallen to 0·0% [this *Bulletin*, 1957, v. 54, 1053]. In 1956 anti-mosquito measures were discontinued in two-thirds of the old malarious area, but a *cordon sanitaire* has been maintained along the east, south and north borders; all huts in these areas had 2 applications of BHC in the year. During the transmission season of 1957 a random sample of 5,427 infants and children showed 0·2% infection in areas where spraying has ceased, 0·3% in the sprayed Mozambique frontier area, 2·45% in an irrigation area, still sprayed; some of the last may not have acquired the infection locally. Pyrimethamine 25 mgm. twice monthly was given to all children [half the dose was given to those under 4 years] in 1 difficult corner of the country in which spraying alone could not reduce the child parasite rate below 40%, and no parasite-positive case was observed throughout the last transmission season. The issue of prophylactics will be extended to the irrigation areas next season. *A. gambiae* has never disappeared, and adults have reappeared in huts where spraying was discontinued, but in small numbers. *A. funestus funestus*, thought to have been eliminated, has been found again in one small area. The annual cost of antimalarial operations per head of population was 12·8d. when all huts were sprayed, 8·5d. with only the *cordon sanitaire* area sprayed.

Despite the remarkable results achieved so far eradication of malaria cannot be achieved quickly. The cooperation of the Portuguese authorities in a scheme for control along the Mozambique border is one essential; even when spraying is discontinued altogether, surveillance must be carried on for some years. It is believed that then anophelism without malaria can be permanently established in Swaziland. *B. B. Waddy*

Dhir, S. L. & Rahim, A. **Malaria and its Control in Afghanistan (1950–1954).** *Indian J. Malariology.* 1957, Mar., v. 11, No. 1, 73–126, 8 charts & 2 maps.

Afghanistan is a landlocked country, 250,000 square miles in area, in which 5 distinct zones of climate can be recognized; desert, steppe, subtropical, temperate and extreme Alpine. Rainfall is low, ranging from 11 to 15 inches per annum, but there is a network of big rivers and smaller watercourses coming down from the heights. The population is about 12,000,000, of whom 11,000,000 live completely rural lives, 2,000,000 being nomads.

Malaria prevalence is associated with irrigation, mainly of ricefields; among people living away from rivers and irrigated valleys incidence is very low. Out of 16 species of *Anopheles* identified, *A. superpictus* is the chief vector of malaria, the other vector being *A. culicifacies*, in only one province. Both are equally susceptible to DDT and have not yet shown any sign of developing resistance. The transmission season, in most parts, is from mid-July to mid-October, and a single application of DDT, 1 gm. to 1 square metre, annually is the antimalarial measure adopted in rural areas. In urban areas DDT is used as a larvicide. Control operations were started in 1949. By 1954 the population under control was 1,279,000. In nearly all controlled areas the infant parasite rate was reduced to zero; in all, spleen rates were halved or better, average enlarged spleens reduced, and general health greatly improved.

A number of tables gives malariological and other details, including those of administration. The staff engaged on the scheme included 8 doctors and 2 entomologists. 21 motor vehicles were employed.

B. B. Waddy

Zuckerman, Avivah. **Blood Loss and Replacement in Plasmodial Infections. I. *Plasmodium berghei* in Untreated Rats of Varying Age and in Adult Rats with Erythropoietic Mechanisms manipulated before Inoculation.** *J. Infect. Dis.* 1957, Mar.–Apr., v. 100, No. 2, 172–206, 6 figs. [Numerous refs.]

This paper is the first of a series designed to elucidate the factors affecting the course of infection and innate immunity in rats infected with *Plasmodium berghei*, with special reference to the effect of blood loss and replacement. The problem was studied experimentally by manipulation of the host's erythropoietic mechanism, as a means of

modifying its innate immunity. In view of the predilection of *P. berghei* for immature red cells particular attention was devoted to the correlation between the reticulocyte level and the plasmodial infection. For a precise definition of the cells involved the author classifies the reticulocytes in 5 groups, from + to + + + + + in the ascending order of their immaturity which is characterized by the degree of development of the reticulum. She also introduces the basophilic index, representing the sum of the amounts of reticular substance in all classes of reticulocytes in a population of 4,000 red cells. In addition to these elements, the formula of a blood film includes the percentage of reticulocytes.

The results obtained in this study, which are described and analysed in great detail, and are illustrated by numerous graphs and tables, were as follows. It was found that in normal rat blood the predominating type of reticulocyte belongs to the second class (+ +). The manner in which blood loss occurs in the course of infection varies according to the host's age: in young rats it is due to rupture of the red cells by the developing parasites, but in mature rats their destruction is also aided by what appears to be a lytic antibody. In all age-groups of rats the replacement of reticulocytes takes place about a week after inoculation of the parasites and reaches a peak 4–5 days later, thereby restoring the normal level. Evidence of age-immunity to the infection is provided by the correlation of the rhythm of reticulocyte replacement and acquisition of immunity, which in adult rats proceeds more rapidly than in young ones, and by the fact that reticulocytes are numerous in young rats and scanty in mature ones before crisis.

It is pointed out that reticulocyte replacement proceeding during the period of innate immunity before crisis may endanger the host's life by intensifying parasitaemia, because of increased invasion of the reticulocytes by merozoites, but, once immunity has been acquired after crisis, the course of infection is not adversely affected by reticulocytosis, owing to elimination of the merozoites. Both in grown-up and young rats the parasites invade reticulocytes of the third and fourth types (as well as normoblasts) but not those of the first, second and fifth types, or erythrocytes, none of which is affected. When adult rats are bled before inoculation of *P. berghei*, they react like young rats in that parasitaemia is intensified, owing to impairment of innate immunity due to the availability of numerous reticulocytes, and the development of acquired immunity is inhibited; the loss of blood in these animals is always due to rupture of host-cells and prebleeding does not interfere with the course of reticulocyte repair. *C. A. Hoare*

Mercado, Teresa I. & von Brand, T. **The Influence of some Steroids on Glycogenesis in the Liver of Rats Infected with** *Plasmodium berghei*. *Amer. J. Hyg.* 1957, July, v. 66, No. 1, 20–28. 6 figs. on pl.

It has been shown by the authors [this *Bulletin*, 1954, v. 51, 1039; 1956, v. 53, 718] that the glycogen in the liver of rats is depleted during infection with *P. berghei*. The effect of steroids on glycogen synthesis in normal and infected rats has now been studied. For this purpose the liver content of rats infected and uninfected during starvation, and while being fed with fructose, was studied, and at the same time while these 4 groups were receiving steroids including cortisone, Meticortelone, Meticorten or prednisolone, under conditions most favourable for synthesis of glycogen. Histochemical studies of other tissues were also made.

It appeared that the simultaneous administration of fructose and steroid gave rise to a synergic effect on glycogen synthesis in infected animals. Prednisolone was the least effective compound. Glycogenesis was more pronounced in control animals receiving steroids. The patchy distribution and decreased amounts of glycogen in livers of rats infected with *P. berghei* has previously been noted and was thought to result from anoxia. A more normal distribution occurs when steroids are administered. The lipid depletion found in the adrenal cortex under these conditions was rendered less severe by Meticortelone. The authors attribute reduced glycogen synthesis to adrenal dysfunction in combination with centrilobular damage to the liver due to anoxia. *J. D. Fulton*

TRYPANOSOMIASIS

*In this section abstracts are arranged as far as possible in the following order:—*African*—human, animal;* American*—Chagas's disease and other trypanosome infections. In each form the following order is followed:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Bursell, E. **Spiracular Control of Water Loss in the Tsetse Fly.** *Proc. Roy. Entom. Soc. of London.* Ser. A. 1957, Apr. 18, v. 32, Pts. 1/3, 21–9, 2 figs. [12 refs.]

The rate of water loss of teneral *Glossina morsitans* in the absence of spiracular regulation, *i.e.*, with the spiracles completely closed with paraffin wax or kept open in an atmosphere containing sufficient carbon dioxide, is a linear function of humidity. In normal flies, however, the rate of loss is less in drier air than at higher humidities, showing that there must be some degree of closure of the spiracles which is correlated with the atmospheric humidity. In younger teneral flies there is less spiracular control than in older flies.

The degree of closure of the spiracles is also controlled by the water

content of the fly itself. During the course of desiccation the rate of water loss decreases with time, which indicates that the spiracles close as the fly becomes more desiccated. Hence the more precarious the state of its water reserves, the stricter the regulation.

An attempt was made to determine the sense organ or organs responsible for the integration of water content and atmospheric humidity with closure of the spiracles, by the removal or extirpation of the appendages bearing them. The rates of water loss at various relative humidities were then studied, but no conclusions could be reached.

All flies used were kept in the dark so that a constant level of activity could be maintained. Fed flies were not used as they show little or no spiracular control of water loss. *D. S. Saunders*

Nash, T. A. M. & Steiner, J. O. **The Effect of Obstructive Clearing on *Glossina palpalis* (R.-D.).** *Bull. Entom. Res.* 1957, June, v. 48, Pt. 2, 323–39, 4 figs.

Study of the ecology of *Glossina palpalis* in the riverine vegetation to which it is confined in the savannah belt of Northern Nigeria [see this *Bulletin*, 1953, v. 50, 1124] suggested a new method of control to the author. The present paper describes the results of experimental application of this new method which he calls obstructive clearing. This consists of felling only the riverine trees so that they block with trash the stream bed and obstruct the flight-line of the tsetse; the dense riverine thickets are left uncut. It is thus the reverse of the present method of control by partial clearing, which also arose from earlier ecological studies [*ibid.*, 1956, v. 53, 288], and which has the disadvantage that the felled thickets regenerate quickly so that their complete suppression requires repeated treatment over a number of years, a costly proceeding.

The experiments here described have shown that, with complete isolation by ruthless barrier clearing, eradication of this species of tsetse can be achieved in as short a time as 3 months; the area so treated has remained free from the flies for a year. Even if isolation is not complete, a first experiment showed that the method still succeeds, and that although tsetse returned during the rains, the conditions created were so unfavourable that they could not survive during the first or the second succeeding dry season. Observations showed that the alteration in habitat caused an increased hunger in the flies, partly, it is thought, by blocking their free flight under shade in search of food, and partly by production of conditions distasteful to the creatures on which they feed.

A detailed description of the technique is given; the method uses only small gangs of labourers (about 40 strong) and operations are carried out in 3 phases. A photograph shows the end result and a sketch map the scale and lay-out of the experiments. An appendix gives details of the vegetation dealt with. [Details such as these are welcome as valuable

to anyone attempting to apply the technique elsewhere.] The method costs only half as much as the partial clearing in present use, as well as needing no immediate costly suppression of regrowth; how long it will remain effective has still to be seen. It is only useful for large-scale projects, and cannot be applied to the small-scale protection of villages because of reinvasion by the fly during the rains; here partial clearing must still be used. *W. H. Potts*

Fryer, J. D., Johns, D. L. & Yeo, D. **The Effects of a Chemical Defoliant on an Isolated Tsetse Fly Community and its Vegetation.** *Bull. Entom. Res.* 1957, June, v. 48, Pt. 2, 359–73, 1 fig. [12 refs.]

The authors give a detailed account of an attempt to use the new herbicides, substituted phenoxyacetic acids, in control of tsetse by defoliation of the habitat. Early work on defoliants and preliminary trials with the new ones are briefly referred to; as a result of the latter, which tested 2,4-dichlorophenoxyacetic acid, 2,4,5-trichlorophenoxyacetic acid and their *n*-butyl esters, it was decided to try application, on a large scale from the air, of the butyl ester of the second acid. The experiment was carried out on the Waturi peninsula, on the southern shores of the Kavirondo Gulf of Lake Victoria, in Kenya; the species of tsetse involved were *Glossina pallidipes* and *G. palpalis*.

The area and its climate are described, as are also the methods used for the assessment of the effect of the spray applications on the vegetation and on the tsetse; details of the meteorological conditions during application and of the droplet size of the sprays are given. There were 3 spray applications at intervals of 6 weeks; the estimated dosage reaching the leaves was 2·2 lb. per acre in the first application, but less in the 2 subsequent applications. This resulted in the rapid defoliation of 13 out of 15 of the observed leafy plants; 8 of these died during the following 9 months, as did also 2 species of succulent *Euphorbia*. One of the two species (*Boscia* sp.) not rapidly defoliated only became completely leafless after the third application and recovered slowly; the other one (*Leeaniodiscus vaughaniae*) was never more than slightly affected.

There was no significant effect on the tsetse population during the first 9 months after the spraying. The reasons for this are discussed and it is concluded that various factors combined to allow an environment favourable to the tsetse to persist in one part or other of the peninsula in spite of the severe defoliation. But 9 months after the first spraying an accidental fire destroyed between a third and a half of the vegetation. This reduced the *G. pallidipes* at once to a fairly low level, maintained for the last 16 months of the investigation. The environment of *G. palpalis* was hardly affected. This destruction of the vegetation was

undoubtedly an effect of the spraying, as the thicket is normally unburnable; but further trials suggested factors which may make satisfactory burning after such defoliations not always so effective. *W. H. Potts*

Pizzi, Tulio. Inmunología de la enfermedad de Chagas. [**Immunology of Chagas's Disease**] 183 pp., 37 figs., 1957. Santiago: Centro de Publicaciones Biológicas, Universidad de Chile, Casilla 12967, Chile.

While considerable advances have been made in our knowledge of the immunology of malaria, comparatively little is known about the defence mechanisms in trypanosomiasis, especially in diseases caused by the Old World pathogenic trypanosomes of the *vivax*, *congolense* and *brucei* groups. On the other hand, the factors involved in immunity have been fully elucidated in the case of the non-pathogenic murine trypanosomes (*Trypanosoma lewisi* and *T. duttoni*), in which it was shown that humoral factors (ablastins and lysins) play a major part.

Until the present author and his associates started their studies in 1949, there was only circumstantial evidence of immunity to Chagas's disease, but nothing was known about its mechanism. This problem was investigated experimentally in a strain of *T. cruzi* of stabilized virulence, with hosts (rats and mice) of known genetic constitution. In a series of papers [abstracted in this *Bulletin*, 1955, v. 52, 347, 618; 1956, v. 53, 297, 298] the author has demonstrated that in Chagas's disease cellular factors were almost exclusively responsible for the development of immunity: the destruction of the parasites was found to be effected by phagocytosis, in which the principal part is played by macrophages and by inflammatory processes in the course of the infection. This work has also thrown light on the apparent paradox that, in the course of acquisition of immunity, the very same macrophages which harbour the parasites as host-cells undergo physiological changes whereby they are transformed into phagocytes which destroy these parasites.

In the present monograph the author has brought together the results of all his researches on the immunology of Chagas's disease. In an introductory chapter, a critical review is given of the state of knowledge up to 1949, when the author began his studies. The second chapter deals with the material and methods used in his investigations. In the following chapter a detailed description is given of elements of the macrophage-lymphoid system (including the reticulo-endothelial system) and of the part played by these cells—and by inflammation—in the cellular mechanism of immunity. In the fourth chapter an account is given of the course of infection and the development of immunity in animals infected by different methods (with virulent trypanosomes, attenuated cultures or infected faeces of Triatomid bugs). The last chapter is devoted to a general discussion of the defence mechanism in Chagas's disease in the light of the data described.

This work is illustrated by tables, charts and figures, and contains numerous references.

The solution of the problem of the immunological processes in this important human disease is an achievement of which the author can justly be proud, and the publication of this monograph will be welcomed by all students of tropical medicine and parasitology. *C. A. Hoare*

Berning, H. Die Myokarditis in den Tropen (Venezuela) als Erkrankung der Landbevölkerung. [**Myocarditis in the Tropics (Venezuela) as a Disease of the Rural Population**] *Deut. med. Woch.* 1957, July 19, v. 82, No. 29, 1186–8, 1198–9, 1215–16, 9 figs. [Numerous refs.]

Myocarditis is common in Venezuela. Of 49 males with the disease 33 were agricultural labourers, 2 general labourers, 4 school teachers, 1 cowherd, 6 brick layers, 1 cobbler, 1 waiter, 1 chauffeur. It is clear that there is a direct connexion with country pursuits. Acute and chronic forms are recognized.

The acute, clinically manifest myocarditis, was relatively rare and was only seen in children (5 cases).

Chronic myocarditis, without decompensation, was also rare and was seen only in middle age (6 cases). The clinical symptoms resembled those of compensated valvular disease. There was massive dilatation of the left ventricle, and venous hypertension soon made its appearance. Recovery was not observed; within months or years the terminal phase, with marked dilatation and decompensation, set in, a sequence which was observed in 73 cases. On an average, distressing symptoms lasted about 10 months. Electrocardiographic changes are invariable but are extremely numerous and varied.

Skiagraphy plays an important part in diagnosis and invariably shows enlargement of the heart to the right, left or in an upward direction. The author compares the overall picture to that demonstrated by Wenckebach for the beriberi heart.

As regards aetiology, all factors have been considered, especially ankylostomiasis. Schistosomiasis mansoni with myocarditis occurred in only 3·4%. Hookworm infection, in spite of the anaemia, did not seem to be a really important factor. The qualitative and quantitative effect of dietetic insufficiencies naturally has great importance in the pathogenesis of myocarditis, but this, on investigation, did not seem to be decisive and treatment with vitamin B complex preparations proved ineffective.

The suggestion that this myocarditis may be of parasitic origin receives some support from the parallel incidence in both sexes and the preponderance of land workers of a low social level, living in unhygienic surroundings. There is a strong clinical resemblance with *myocarditis chagasica* produced by *Trypanosoma cruzi* as described in Brazil and

Venezuela. Xenodiagnosis appears to be of little value in making a definite decision, but the complement-fixation test was positive in all patients of another series, quoted by the author, who therefore thinks that there is little doubt that the parasite is the cause.

Philip Manson-Bahr

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Lupaşcu, G., Duport, M., Cristescu, A., Manoiu, C. & Raicu, V. Prezenţa în Republica Populară Romînă a speciei *Phlebotomus perfiliewi*. Oecologie şi fenologie. [**Record of** *Phlebotomus perfiliewi* **in Rumania. Ecology and Phenology**] *Studii şi Cercetări Inframicrobiol., Microbiol. şi Parazitol.* 1957, v. 8, No. 1, 121–30. [20 refs.] French summary.

The following is a translation of the authors' summary:—

During observations between August and October 1955, in one of the zones of distribution of *Phlebotomus papatasi* (the Craiova region) where a focus of visceral leishmaniasis was found in 1954, *P. perfiliewi* was identified for the first time in this country.

P. perfiliewi under the prevailing conditions of 1955—a cool summer with much rain—was seen as a wild species, frequent in natural habitats such as the burrows of *Citellus citellus* and especially the nests of *Merops*, and was rare near human communities. The burrows and the birds' nests studied were used as daytime shelters and, in some cases, as a retreat for ovipositing females.

P. papatasi was not found in the natural habitats examined.

The places of development and shelter of *P. perfiliewi* in this country seem to differ from those recorded by some authors in other countries. It is added that this species was also captured in 3 houses, in 2 of which cases of visceral leishmaniasis had been found in 1954.

H. J. O'D. Burke-Gaffney

Convit, J., Reyes, O. & Kerdel, F. **Disseminated Anergic American Leishmaniasis. Report of Three Cases of a Type clinically resembling Lepromatous Leprosy.** *Arch. Dermat.* 1957, Aug., v. 76, No. 2, 213–17, 5 figs.

What is known as "disseminated anergic American leishmaniasis" appears to have first been described in 1913 by Thomson and Balfour in the Sudan, but the first case of this type in South America was

reported by Barrientos [this *Bulletin*, 1950, v. 47, 25] in Bolivia in 1948; the second by Convit and Lapenta (included in the 3 below); the third by Ortiz and Pardo in 1949 [*ibid.*, 1949, v. 46, 1134]; the fourth by Chakravarty and Bhattacharyya in 1951 in India.

The present paper concerns 3 cases from Venezuela and is illustrated by excellent photographs which bring out forcibly the remarkable resemblance of this condition to leprosy. One patient was actually mistakenly interned in a leprosarium before the true nature of the disease was realized. It is even suggested that the striking resemblance justifies the name of "lepromatoid". The characteristic lesions are erythematous macules, diffuse infiltrations, plaques, papules and nodules which present a keloidal, xanthomatous, or verrucose appearance. Sometimes the lesions tend to break down when exposed to trauma. The colour varies from straw-yellow to slight erythema, port-wine colour and violet. The sites of predilection are the face, ears, elbows and knees: in one patient the glans penis was affected. No lesions of the nasal mucosa were observed, although leishmaniae were found in smears. No nodules were found on the scalp, axillae, palms and soles.

The course of this peculiar form of leishmaniasis is progressive and chronic, with occasional periods of exacerbation without affecting the general health. These observations were made on 2 patients over a period of 10 years. In 2 patients, erythematous macular eruptions developed on the trunk. An important point was the consistent negative response to the intradermal test with leishmanin (Montenegro's test). Smears and histological examination in all stages of the disease showed large numbers of parasites.

The type of leishmania is *L. braziliensis*. The pathological picture is atrophy of the epidermis with moderate hyperkeratosis. The dermis presents a granuloma formed of cells with large vacuoles packed with leishmaniae.

The enormous numbers of parasites in these lesions constitute an important reservoir of infection. This is particularly true in incipient cases in which diagnosis is difficult. Considering the large numbers and wide distribution of the lesions, and the comparatively large size of the nodules, it is not surprising that all therapeutic measures failed. In one patient there was an initial temporary improvement with antimony potassium tartrate, but there were relapses and later the condition followed its course unaffected by further treatment.

Philip Manson-Bahr

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

Dumoulin, F. V. B. & Bryan, J., with the collaboration of F. H. Diercks & M. Haccou. **Scrub Typhus in a South Sumatra Oil Field.** *Med. Bull.* New Jersey. 1957, Mar., v. 17, No. 1, 66–77.

Scrub typhus has become increasingly frequent during the last 4 years among the indigenous labour force and their families in this Southern Sumatran oilfield, which is controlled by the Standard Oil Company. The terrain comprises rolling, scrub-covered country suitable for the cultivation of dry rice, with large tracts of tall grass (*alang-alang*) which grows on areas of former cultivation. Two species of rats trapped in this area, *Rattus rattus argentiventer* and *R. r. jalorensis*, showed a 50% incidence of infestation with larval mites. From one such infested rat *Rickettsia tsutsugamushi* was isolated, while the sera of many others gave a positive Weil-Felix reaction. Two species of mite were identified, *Trombicula akamushi* and *Euschöngastia indica*, a common inter-murid vector. The Sumatran labourers have adopted to an increasing degree the practice of illegal rice cultivation in the environs of the oilfields, their families often occupy huts on their rice fields and during the harvest the whole family may sleep there. A high incidence of the disease is related to their increased agricultural activity in the period preceding the annual rains, which fall in December and January.

The Southern Sumatran strain of *Rickettsia tsutsugamushi* appears more benign than that of New Guinea and Japan, and the authors have had no fatality in some 300 cases. In the more severe case the clinical picture has been characteristic, with a primary lesion in the groin, on the genitalia or in the axilla, a sustained fever, morbilliform rash, lymphadenopathy and transient enlargement of liver and spleen. However, many less severe cases have lacked diagnostic clinical features, and could only be recognized from the results of laboratory investigation. Since the rickettsial complement-fixation test is highly strain-specific and suitable local antigens were not available, reliance had to be placed on the Weil-Felix agglutination reaction, with the Kingsbury strain of *Proteus*. Rickettsaemia was detected in 2 of 9 patients tested by mouse isolation methods.

The patients were treated with chloramphenicol, 250 mgm. being given orally 6 times daily from admission until the end of the 6th afebrile day. Patients were usually afebrile within 24 hours. On an average, only 10 days' hospital treatment was required. Only three relapses seem to have been encountered, though antibiotic therapy was never delayed in order to allow a degree of natural immunity to develop.

Diagnostic procedures are discussed but it is concluded that a rigidly controlled agglutination reaction with the *Proteus OXK* antigen remains

the only practicable procedure in the field; even then titres will fail to reach a diagnostic level in 30% of cases. Prophylaxis by immunization, individual protection by clothing and mite repellants, extermination of the rodent reservoir or of the vector population by insecticides, are all impracticable in this endemic area. [There is, however, no mention of the occurrence of the disease among the European staff.]

J. H. Walters

Kitze, Lois K., with the assistance of Hazel C. Hiemstra & Maria S. Moore. **Q Fever in Wisconsin. Serologic Evidence of Infection in Cattle and in Human Beings and recovery of *C. burneti* from Cattle.** *Amer. J. Hyg.* 1957, May, v. 65, No. 3, 239–47, 1 fig. [16 refs.]

Complement-fixation (CF) tests with *Rickettsia burneti* antigen (Nine Mile strain) on sera from 22,304 cattle from 2,130 herds in Wisconsin gave positive results with 425 specimens (1·9%) in dilutions of 1 in 10 or greater. The highest incidence of positive tests and the highest titres were found in sera from cattle in 9 contiguous south-eastern counties. In this area, *R. burneti* was recovered from 7 out of 8 specimens of milk from cows with positive CF tests.

Positive CF tests were also obtained with 7 out of 30 sera (23·3%) from persons on infected farms and with 92 out of 2,035 sera (4·5%) from employees at a meat packing plant. Tests on sera from 732 persons admitted to general hospitals gave 3 positives (0·4%).

The significance of these findings where human health is concerned has yet to be determined. Only 1 case of pneumonitis with serological evidence of Q fever, which must have been acquired in Wisconsin, was diagnosed during the survey. *R. S. F. Hennessey*

Soběslavský, O. Experimentální infecke kura domácího (*Gallus gallus domesticus*) *R. burneti*. [**Experimental Infection of the Domestic Fowl (*Gallus gallus domesticus*) with *Rickettsia burneti*.**] *Československ. Epidemiol., Mikrobiol., Imunol.* Prague. 1957, v. 6, No. 3, 146–51. English summary.

5 hens infected with *Rickettsia burneti* by subcutaneous, intraperitoneal or intranasal inoculation excreted the organism in the faeces between the 14th and 42nd days after infection. No signs of illness were observed, except in 1 hen which died from a malignant neoplasm of the large intestine after 96 days; at autopsy rickettsiae were recovered from the blood and internal organs, and it was considered that the growth of the tumour had resulted in the activation of a latent infection. Attempts to revive the infection in 2 of the remaining hens by injections of cortisone were unsuccessful. Serological investigations showed that complement-fixing antibody appeared in low titres 3 weeks after infection and disappeared after 40 days. The organism was isolated from 6 to 13 eggs

laid by 2 of the infected hens between the 19th and 42nd days after infection, and in 3 of 4 chickens between 2 and 55 days after hatching, and the occurrence of transovarian transmission was therefore demonstrated.

D. J. Bauer

BARTONELLOSIS

Perez Alva, S. & Giuntini, J. La maladie de Carrion. Étude morphologique de *Bartonella bacilliformis* au microscope électronique. [**Carrión's Disease. Electron Microscopic Studies of** *Bartonella bacilliformis*] *Bull. Soc. Path. Exot.* 1957, Mar.–Apr., v. 50, No. 2, 188–94, 14 figs. on 2 pls. [12 refs.]

A summary of previous studies by electron microscope of the morphology of *Bartonella bacilliformis* was made by Wigand *et al.* [this *Bulletin*, 1954, v. 51, 565]. The present authors studied the morphology, size, and method of division of the organism.

The strain used was No. 529 from the National Institute of Hygiene of Lima, Peru; it had been maintained for 15 years by successive passages on Noguchi's medium. The organism was grown on (a) a liquid proteose-peptone medium reinforced with ascorbic acid, rabbit blood, and rabbit haemoglobin; and (b) 50% blood agar slopes which gave better preparations for observing flagella. The preparations were fixed in osmic acid and shadowed with gold-palladium on formvar films.

Pleomorphism was evident, coccal, diplococcal, and bacillary forms being present. A definite cell membrane and intracytoplasmic granules were observed. It is suggested that these granules may have arisen during centrifugation of the suspensions in the preliminary stages of preparation. However, the granules had an appearance very different from the possible degeneration of the cytoplasm and membrane. Flagella were most clearly seen when taken from blood agar medium after 8–15 days' growth. They were 3–4 in number and might be spiral. They had a common insertion in the cytoplasm. Motility was confirmed by dark-ground examination of the culture.

Because the cells were pleomorphic only average dimensions could be given. The bacilli measured 1·9–0·8 μ in length and 0·7–0·2 μ in breadth; cocco-bacilli were 1–0·5 μ by 0·6–0·3 μ; cocci 0·9–0·25 μ by 0·8–0·2 μ. Flagella were 20–2 μ long. Binary fission was clearly observed as the method of division. The authors conclude that the size of the cells, possession of a membrane and flagella, and ability to be cultured *in vitro*, undoubtedly allow *Bartonella bacilliformis* to be classified among bacteria. It is clearly separated from species of *Eperythrozoon* and *Grahamella*.

May F. McCallum

Perez Alva, S., Roger, F. & Roger, Annie. La maladie de Carrion. Résistance de *Bartonella bacilliformis* au processus de lyophilisation. [**Carrión's Disease. Resistance of *Bartonella bacilliformis* to Lyophilization**] *Bull. Soc. Path. Exot.* 1957, Mar.–Apr., v. 50, No. 2, 243–9. [14 refs.]

The introduction to this paper describes the destruction of *Bartonella bacilliformis* at different temperatures and when acted upon by chemical agents or antibiotics. Survival in different culture media is also reviewed. An adequate preservation of strains may be obtained at laboratory temperatures (20–25°C.) in semi-solid media, and also in blood broth, if the tubes of medium are hermetically sealed with rubber stoppers to prevent drying. Subculturing must be carried out every 3–5 months.

The organisms undergo a progressive inactivation in liquid media when stored for long periods but this can be slowed down if the suspending medium is frozen and cultures are stored at −80°C. Freezing does not assure prolonged preservation of the organisms nor does it allow transport of cultures over long distances in hot climates. Freeze-drying has overcome these difficulties with other organisms and has been attempted with *B. bacilliformis*.

The technique employed was in two stages, preliminary freezing at −80°C. followed by sublimation under vacuum at −18°C. (*i.e.*, at a temperature lower than the melting point of the suspending medium). The medium used was deficient in electrolytes and its isotonicity was stabilized by addition of sucrose. The ampoules were sealed under vacuum because the dry product obtained was very hygroscopic.

B. bacilliformis resisted the process of freeze-drying, and good growth could be obtained in 10–12 days with material taken from ampoules. This shows a latent period, suggesting slow multiplication of the organisms, and a further experiment was carried out to determine whether it was due to a modification of the organism or to a partial destruction.

A series of dilutions of liquid culture ranging from 10^{-1} to 10^{-24} were seeded into blood broth before and after lyophilization. The titre limit of growth for lyophilized organisms was 10^{-6} and for non-lyophilized organisms was 10^{-19}, thereby showing that there was partial destruction of *Bartonella* during freeze-drying. *May F. McCallum*

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

Mims, C. A. **The Invasion of the Brain by Yellow Fever Virus present in the Blood of Mice.** *Brit. J. Exper. Path.* 1957, June, v. 38, No. 3, 329–38, 1 fig. [11 refs.]

When yellow fever virus (Asibi) was administered intraperitoneally to 1-day-old mice, virus titres in the liver and blood rose 1–2 days earlier than in the brain, even when starch was injected intracerebrally immediately after the virus inoculation. Virus was detectable about the same time (78 hours) in the anterior and posterior parts of the brain and in the spinal cord. After intracerebral inoculation of 10 LD50, virus multiplied in the brain about a day earlier than in the liver. In adult mice, virus was not detectable in the liver or serum at any time after intravenous, intraperitoneal or subcutaneous inoculation of 100 LD50 of Asibi virus; after intracerebral inoculation there was evidence of low-grade viraemia, but no virus was found in the liver. Nearly all of the virus inoculated intravenously disappeared from the blood within 10 minutes.

It is suggested that the difference between the susceptibility of infant and adult mice to peripheral inoculation of yellow fever virus may lie in the ability of capillary endothelial cells of infant mice to support virus multiplication. In infant mice inoculated peripherally, virus growing in capillary endothelium in the central nervous system may be released both into the blood and into the adjacent nervous tissue.

R. S. F. Hennessey

Fads, R. B. & Strom, L. G. **An Additional United States Record of *Haemagogus equinus*.** *Mosquito News.* 1957, June, v. 17, No. 2, 86–9, 1 fig.

Intensive searches in South Texas by numerous workers of different public health bodies have produced one further record, the second, for *Haemagogus equinus* breeding in this part of the United States. Pupae were recovered from a treehole in a tree, about 15 ft. in height, in a stand of thorn scrub within 16 miles of Brownsville. The site was near the place where the species was first recorded in 1956 [this *Bulletin*, 1956, v. 53, 1231]. No adult *Haemagogus* came to bite the searchers, even although they sat in the area as bait. The semi-arid climate and constantly decreasing acreage of thorny bush indicate that large populations of this mosquito, of interest in connexion with the northward spread of yellow fever from beyond Panama in recent years, are unlikely to develop. The paper includes a list of 44 other species of mosquito taken in Cameron County, Texas. *Aëdes aegypti* was rare, and absent from

Brownsville. *Anopheles quadrimaculatus* remains numerous. *A. albimanus*, abundant in 1940–45, was rare as was also *Culex tarsalis*.

D. S. Bertram

Pan American Sanitary Bureau. **Manual of Operations for an *Aedes aegypti* Eradication Service. Part Two. Manuals of Instruction.** Mimeographed pp. 200–263, 3 pls. & 3 figs. 1957. Mar. Wash. 6, D.C.: World Health Organization, 1501 New Hampshire Avenue, N.W., U.S.A.

This publication, Part 2 of the complete manual written in Spanish, describes the duties and responsibilities of inspectors and foremen in an *Aëdes aegypti* eradication programme as they were defined and practised in South and Central American countries where this mosquito has already been eradicated. These men carry out the larval and adults surveys and control, by perifocal treatment of breeding places with DDT, within a limited zone which is intimately known to them. The work is subject to supervision by a system of checks and cross-checks, in the first instance by the foreman and in turn by more senior officials. The text gives in full detail the kind of information inspectors and foremen should be thoroughly conversant with and, indeed, have available for reference in their daily work—methods of survey, collection, and recording of data, the preparation and application of the DDT suspensions and so on.

Two- or three-litre hand-pressure sprayers with fan-shaped spray discharge at a rate of one pint per minute are recommended for use in perifocal treatment. Detailed assemblies are figured for a model standardized by the Bureau. The Brazilian "Excelsior" and the English "Dronwal" sprayers have also proved satisfactory. Perifocal treatment is applied to all containers which do, or may possibly, breed *A. aegypti*. With a 5% suspension (prepared from, for example, 75% DDT wettable powder) the outside and inside surfaces of a container are sprayed, ensuring also about 2 drops of the spray for every litre of water which the container holds or may hold. Adjacent walls are sprayed for about 3 feet on each side of the container and to 3 feet above floor level. The top 2 feet only of a moderate pile of tyres need be sprayed. Addition of DDT powder in measured quantities is recommended for large containers such as cisterns. Senior officials should be consulted about the control of unusual breeding places.

Besides the illustrations of the sprayers, there are essential diagrams for the recognition of the larva and adult of *A. aegypti*, and specimen forms of various kinds used for recording and summarizing data.

For those who may be concerned with organizing and administering an *Aëdes aegypti* eradication project, this publication would be invaluable as a model on which to base the training and functioning of their field staff.

D. S. Bertram

RABIES

Schneider, N. J., Scatterday, J. E., Lewis, A. L., Jennings, W. L., Venters, H. D. & Hardy, A. V. **Rabies in Bats in Florida.** *Amer. J. Pub. Health.* 1957, Aug., v. 47, No. 8, 983–9, 1 fig. [12 refs.]

In the United States rabies in bats was first recognized in June 1953, when in Florida the virus was isolated from an insectivorous, free-living bat, *Dasypterus floridanus*—a Florida yellow bat, which had bitten a child. Subsequent findings of rabies infection in 4 of 30 Florida yellow bats and in 1 of 39 *Lasiurus seminolus* (seminole) bats, taken near the ranch where the first rabies-positive bat was discovered, led the authorities in Florida to institute a State-wide investigation to determine, if possible, the significance of these findings in the epizootiology of the disease and its possible importance to the entire rabies problem. The results of this investigation are given in the present article.

Between 1953 and 1956 bats collected and forwarded for laboratory examination included 12 species—8 colonial and 4 free-living—and totalled 5,503, of which 3,984 were colonial types and 1,519 free-living. Brain material of all bats was examined histologically and by mouse inoculation. Of the 31 positive bats 8 were colonial and 23 free-living. Microscopic findings differed significantly between the two types in that none of the colonial species showed Negri bodies in brain smears stained by Sellers's method, while 15 of the 23 free-living bats were Negri-positive. All positive bats, except 2 suckling *Dasypterus*, yielded rabies virus from brain material inoculated intracerebrally into mice. Salivary gland material of 16 rabid bats was examined by the mouse inoculation test; 13 yielded rabies virus. Positive findings were obtained: among the colonial species in 1 (0·05%) of 1,998 *Myotis austroriparius*, in 1 (0·4%) of 281 *Myotis grisescens*, in 2 (0·6%) of 327 *Pipistrellus subflavus* and in 4 (0·4%) of 1,129 *Tadarida cynocephala*; and among the free-living species in 3 (1·9%) of 154 *Lasiurus borealis*, in 5 (0·6%) of 785 *Lasiurus seminolus* and in 15 (2·6%) of *Dasypterus floridanus*. Thus among the colonial species the proportion infected varied from 0·05% to 0·6%, totalling for the group 0·2%, while among the free-living species the proportion was from 0·6% to 2·6%, totalling for the group 1·5%. Moreover, during the period of investigation the infection rates for free-living as compared with colonial bats were consistently higher from year to year and relatively uniform. As to the geographical distribution of bat rabies in Florida, a study of the localities from which positive bats had been forwarded showed practically the entire State to be affected.

Finally, although there was no direct evidence of natural transmission of the rabies virus from insectivorous bats to man or lower animals, the possible implications of the following observations cannot be overlooked. Among 35 (20 free-living and 15 colonial) bats sent for examination because of some apparent abnormality, 5 (14%) were proved to be infected with rabies; all 5 positive findings were among the free-living bats. Of

the total 35 bats 12 had bitten human beings and of these 4 (33%) were positive for rabies. Again, throughout the investigation, there had been suggestive evidence of temporal and geographical correlation between the finding of rabid bats and the appearance of sporadic, non-spreading rabies in raccoons and other wild carnivores. There were also instances of bats, rabid and non-rabid, biting household animals.

[According to the Expert Committee on Rabies in its third report (*WHO Technical Report Ser. No. 121*, 1957, p. 19) there have been at least 15 instances in which proven rabid insectivorous bats have bitten human beings. Approximately half of these attacks were unprovoked. Circumstantial evidence has incriminated insectivorous bats as the source of infection in 2 human rabies deaths.] *G. Stuart*

Del Vecchio, V. Ulteriori osservazioni sulla virulenza del virus rabido fisso trattato con mesomucinasi. [**Further Observations on the Virulence of Fixed Rabies Virus treated with Mesomucinase**] *Igiene e San. Pubblica*. Rome. 1957, May–June, v. 13, Nos. 5/6, 261–4.

The English summary appended to the paper is as follows: —

"Notwithstanding their great sensitivity to the rabies virus albino rats did not show any susceptibility to the rabies fixed virus of Rome when inoculated subcutaneously. Such a behaviour undergoes no change after the addition of testicular or microbial mesomucinase."

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

Macchiavello, A. Estudios sobre peste selvática en América del Sur. II. Peste selvática en las zonas fronterizas de Perú y Ecuador. 1. Peste en la Provincia de Loja, Ecuador. [**Studies of Silvatic Plague in South America. II Silvatic Plague in the Frontier Zones between Peru and Ecuador. (1) Plague in the Province of Loja, Ecuador**] *Bol. Oficina Sanitaria Panamericana*. 1957, July, v. 43, No. 1, 19–41, 3 figs. [24 refs.]

This interesting paper is the second of a series of studies of silvatic plague [wild-rodent plague] in South America.

In the previous paper [this *Bulletin*, 1956, v. 53, 584] the author discussed the characteristic features, nomenclature and classification of this form of plague which, as its name suggests, occurs as an enzootic

or epizootic disease among rodents of the wilds. The present article consists chiefly of a summary of the author's own work on the disease and a critical review of the literature having a bearing on the epidemiology and history of plague in the province and town of Loja in Ecuador and in the adjoining region of Peru with which Loja has closer topographical affinities than it has with the other provinces of Ecuador.

Peru and Ecuador are believed to be respectively the first and the last of the countries of the west of South America to be invaded by plague: the former in 1903 and the latter in 1908. The extension of the disease in both countries was centrifugal from the ports of entry of infection to the hinterland and thence to the mountainous regions of the interior, following the lines of travel by railway, road and mountain path.

The author complains that his study of the disease was greatly handicapped by the inaccuracy of the vital statistics dealing with the attacks and deaths in Loja and by the equally unsatisfactory information that was available about the potential insect vectors and rodent reservoirs of plague in the area. Although more than 30,000 fleas had been collected in Loja between 1938 and 1942 no attempts at identification had been made. On one occasion an investigator in Loja is said to have reported that he had been informed of the occurrence of an enormous mortality from plague among the *monos* of a certain locality. The word *mono* in Spanish and Portuguese means monkey but the indigenous population of the place were in the habit of referring to ground-squirrels as *monos*. But for the resulting misunderstanding the occurrence of wild-rodent plague would have been recognized 7 years earlier in Loja than 1946 when the author demonstrated its presence there.

A specially interesting section of the paper is the description of *pestis minor* or ambulatory plague as seen in Loja by the author who had already recognized and studied the disease in Brazil where it was known as *ingua de frio*; this name might be freely translated as "bubonic grippe". The cause was found to be *Pasteurella pestis* of low virulence. Most of the cases occur either at the beginning or end of epidemics and especially among children.

The problem of the factors which reactivate *P. pestis*, causing the occurrence of epizootics in places where the disease has persisted in enzootic form, is discussed and it is admitted that no simple explanation is possible in an area like the province of Loja where there are so many varieties of rodents and fleas and foci of different types of plague, murine, silvatic and combinations of these two. It is suggested that in some localities infection of *Rattus* persists as an enzootic with occasional epidemic outbreaks, whereas in other places the disease is primarily one of ground squirrels from which in special circumstances it becomes transmitted to the Cricetinae, such as *Akodon mollis mollis*, by the flea *Polygenis*, in the absence of *Xenopsylla cheopis* or other murine fleas. This is what appears to have happened when plague invaded the zone of Alamor in the province of Loja close to Peru in 1918 or 1919, at a period

when *Rattus* was still unknown in the area and wild-rodent plague appears to have been the original invader. It is, however, impossible to exclude the possibility that *Rattus* may already have established itself in the warm valleys near the city of Loja and have become infected in enzootic form giving rise to occasional epidemics.

A focus in Lancones, just across the frontier in Peru, forms a homogeneous area with the province of Loja in Ecuador; these two areas are arbitrarily separated because of being situated in different political units.

John W. D. Megaw

Englesberg, E. **Mutation to Rhamnose Utilization in** *Pasteurella pestis*. *J. Bacteriology*. 1957, May, v. 73, No. 5, 641–8, 3 figs. [17 refs.]

Cultures of 16 strains of *Pasteurella pestis* (including 14 glycerin-negative strains) on a modified Endo's agar containing rhamnose yielded stable rhamnose-utilizing (R^+) mutants which appeared after a period of incubation varying from 6 to 20 days. When 20 to 30 R^+ organisms were inoculated on plates previously sown with 1×10^7 R^- organisms, about 6 days elapsed before R^+ colonies became visible. Taking account of this delay, it was estimated that mutation to R^+ occurred at a constant rate of about $2{\cdot}6 \times 10^{-11}$ per bacterium per generation during the period of positive growth of a culture. R^+ mutants retained all the characteristics of the wild type except rhamnose utilization. The ability of R^+ mutants to utilize rhamnose gave no selective advantage until the prototrophic population had ceased to grow. It is considered that a positive reaction on Endo's rhamnose medium in 24–36 hours is a reliable criterion for distinguishing *P. pestis* from *P. pseudotuberculosis*.

R. S. F. Hennessey

Deoras, P. J. & Tonpi, K. V. **Studies on Bombay Rats. I.—Collection of Fleas from** *R. rattus* **and** *Bandicoota bengalensis* **in Bombay City.** *J. Univ. of Bombay*. Sect. B. Biol. Sci. 1956, Nov., v. 25, Pt. 3, 13–22, 2 graphs. [12 refs.]

It is doubtful how much confidence can be placed in the findings in this paper about flea-indices and the sex ratios of fleas, and even of seasonal fluctuations recorded. These data were derived from samples of about 4 rats daily during 1953, the rats being taken from a pit where live rats collected in Bombay are confined until destroyed. It is probably valid that *Bandicota bengalensis* is commoner in Bombay than formerly. *Rattus rattus* is also common still. *Xenopsylla cheopis* and *X. astia* were the only fleas found on these rats. The authors admit that the results of their method require confirmation from a flea survey in which rats are isolated in bags on capture. On the whole, except that *X. brasiliensis* was not found, these findings in 1953 are somewhat similar to those of Webster and Chitre in 1930 [this *Bulletin*, 1931, v. 28, 529].

[The authors of the present paper seem to wish to prove that their method of sampling is adequate for reliable routine rat-flea surveys, but they have not, it seems fortunate to the abstracter, convinced even themselves.] *D. S. Bertram*

Smith, P. N., McCamish, Joan, Seely, Jane & Cooke, G. M. **The Development of Pneumonic Plague in Mice and the Effect of Paralysis of Respiratory Cilia upon the Course of Infection.** *J. Infect. Dis.* 1957, May–June, v. 100, No. 3, 215–22, 6 figs. [20 refs.]

The number of *Pasteurella pestis* recovered from the lungs of mice 15 to 30 minutes after exposure to infectious aerosols was about 4·5% of the estimated dose received per mouse. A further decrease occurred up to about 16 hours, after which a logarithmic increase began. *P. pestis* was recovered from the liver at 16 hours and from the spleen at 24 hours after exposure. At 36 hours, all mice had positive blood cultures.

Exposure to formaldehyde vapour 24 hours before infection by aerosol reduced the initial decline in the *P. pestis* content of the lungs, and the rate of increase after 16 hours was accelerated. The 50% lethal dose for formaldehyde-treated mice was about one-tenth of that for untreated controls. It is thought that ciliary paralysis and interference with mucus production may account for the modified infections in formaldehyde-treated mice, possibly associated with other disturbances of defence mechanisms. (About 10% of mice died within 24 hours of inhaling formaldehyde vapour for 30 minutes.) *R. S. F. Hennessey*

Semenova, E. L., Kartasheva, A. L., Abramova, G. F. & Lopatukhina, L. G. **The Relative Therapeutic Efficiency of Bacteriomycin, Aureomycin, Streptomycin and Gamma-Globulin in the Treatment of Plague in Laboratory Experiments.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, No. 3, 428–31, 1 fig. [Translated from Russian.]

"(1) Of the three antibiotics investigated two proved to be effective: bacteriomycin and streptomycin. Bacteriomycin as well as streptomycin have proved to be highly efficient therapeutic agents against experimentally induced plague in guinea-pigs, whereas aureomycin did not have an appreciable therapeutic effect under the same experimental conditions.

"(2) Gamma-globulin from plague antiserum was found to be more effective than the original antiserum itself, but is considerably less effective than the active antibiotics streptomycin and bacteriomycin. This does not, however, altogether exclude the possibility of its use together with antibiotics in some cases."

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Chatterjee, H. N. **Antihistaminics in the Treatment of Uraemia in Cases of Cholera.** Reprinted from *Antiseptic*. 1957, Jan., v. 54, No. 1, 1–9. [20 refs.]

It is stated that in cholera uraemia is second only to circulatory failure as a cause of death. Very acute kidney failure may occur but may be completely reversible, and this together with the extreme capillary dilatation found in some of the internal organs prompted the author to use antihistamine drugs in such cases.

Intially, 2-phenyl-benzylamino methylimidazoline was injected intramuscularly in the kidney region. The results obtained were encouraging and a trial was therefore undertaken of the value of mepyramine maleate (Anthisan), chlorpromazine hydrochloride (Largactil) and promezathine hydrochloride (Phenergan). These antihistamines were also administered intramuscularly in the kidney region and control observations were made on a series of patients to whom saline only was administered. For all patients initial treatment consisted " of emergency management of shock and dehydration ".

It was found that among patients, cultures of whose stools revealed cholera vibrios, urination failed to start in 3 of 11 treated with Anthisan, in 2 of 11 treated with Largactil and in only 1 of 17 treated with Phenergan. In the control group urination did not recommence in 4 of 16 subjects. *A. W. Woodruff*

Gallut, J. Essais d'exaltation du pouvoir toxique de *Vibrio cholerae*. I.—*In vivo* chez les jeunes lapins. [**Attempts to enhance the Toxicity of *Vibrio cholerae*. I.—*In vivo* in Young Rabbits**] *Ann. Inst. Pasteur*. 1957, Sept., v. 93, No. 3, 406–9.

The English summary appended to the paper is as follows:—

" 24 young rabbits aged 6–10 days, have been experimentally infected by the intra-intestinal route. The death-rate was 87% and the animals presented a typical cholera disease. However the toxicity of *V. cholerae* isolated from their stools and reinoculated into new young rabbits remained unchanged in the course of five transfers."

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Baernstein, H. D., Rees, C. W. & Bartgis, I. L. **The Rate of Reproduction of *Entamoeba histolytica* in Microcultures from Inocula of Single Trophozoites in Cell-Free Medium prepared from Embryos of the Chick.** *J. Parasitology.* 1957, Apr., v. 43. No. 2, 143–52. 1 fig. [17 refs.]

An account is given of the growth of *Entamoeba histolytica* in microcultures on chick embryo medium free of intact cells. For this purpose the embryos were ground with Hanks solution, and diluted with the same solution, after which the homogenate was centrifuged and the supernatant fluid was pipetted off. When completed the medium contained 1 ml. each of supernate, horse serum and distilled water. This medium was inoculated with a single amoeba removed with the aid of a micromanipulator from a stock culture in chick embryo medium free of bacteria, and the microculture was incubated at 37°C. Counts of the progeny of the single amoeba were made after 17 to 48 hours, and calculations of generations were made by statistical methods.

The average growth rate of the amoebae was found to be 11·5 generations per 100 hours, with a standard deviation of 1·93 and coefficient of variation of 16·8%. Although horse serum was necessary for cultivation, it could be partially substituted by a mixture of vitamins. It was also shown that small amounts of oxygen did not adversely affect the growth of amoebae. However, the soluble part of the medium alone did not maintain growth, for which the presence of particulate elements was essential: the amount of these available depends on the length of centrifugation. Furthermore, the growth-promoting properties of these particles could be destroyed by heat (56°C.). As regards *p*H, the best growth was obtained between 6·2 and 7·9.

The effects of various factors on the growth of *E. histolytica* are summarized in 13 tables. *C. A. Hoare*

Reeves, R. E., Meleney, H. E. & Frye, W. W. **A Modified Shaffer-Frye Technique for the Cultivation of *Entamoeba histolytica* and some Observations on its Carbohydrate Requirements.** *Amer. J. Hyg.* 1957, July, v. 66, No. 1, 56–62, 1 fig.

In the Shaffer-Frye method of cultivating *E. histolytica* [this *Bulletin*, 1953, v. 50, 112] a thioglycollate-agar medium is pre-conditioned by growth of a selected bacterium. Most bacteria are removed by centrifugation and the resultant supernatant material is mixed with horse

serum and penicillin and protected from air; this medium was successfully used to grow strains of *E. histolytica* for about 1 year. The method of culture has now been simplified, and the medium consists essentially of an enzymatic digest of casein, with glucose and salts at *p*H approximately 7. At the time of transfer of amoebae to the new medium a small amount of horse serum, penicillin and an inoculum of streptobacillus in medium containing yeast extract are added. The vaseline seal is avoided by using screw-top bottles. Furthermore, as the author states, "In this medium, which employs a penicillin-inhibited monobacterial associate, it has been found that amebae will multiply very well if maltose is substituted for glucose, but not if glucosamine, galactose, fructose, mannose, sucrose or sodium gluconate is used as a substitute. In one instance a culture survived for 10 transfers with galactose substituted for glucose, but the rate of multiplication was greatly diminished".

J. D. Fulton

McQuay, R. M., Jr. **Strains of Small Race *Entamoeba histolytica* maintained in Outdated Blood Bank Blood Medium.** *Proc. Soc. Exper. Biol. & Med.* 1957, Mar., v. 94, No. 3, 539–41. [12 refs.]

A description is given of two modifications of the Tarshis medium (devised for growing *Mycobacterium tuberculosis*) [*Bull. Hyg.*, 1953, v. 28, 1095] for the cultivation of the large and small races of *Entamoeba histolytica*. One is a diphasic medium of which the base consists of 6 gm. agar dissolved in 276 ml. distilled water with 4 ml. glycerol. After autoclaving and cooling, 4 ml. penicillin are added; the medium is then thoroughly mixed and 120 ml. of 4-week-old stored bank blood are added to it, and it is mixed again. The medium is then dispensed in tubes (3·5 ml. each) and slanted without butt. The slants are overlayed with 5 ml. saline buffered to *p*H 7·4, and rice-starch powder is added before use. The second medium is fluid, containing the constituents of the base of the diphasic medium without agar, as well as blood, penicillin and 400 ml. of saline, dispensed in 6 ml. amounts in tubes, with the addition of rice starch.

These media were used for the cultivation of 4 strains of the small race and of 3 strains of the large race of *E. histolytica*. All these strains grew very well in the diphasic medium but their cultivation in the liquid medium was unsatisfactory.

C. A. Hoare

Hunninen, A. V. & Boone, H. A. **Studies on the Pathogenicity of Various Strains of *Entamoeba histolytica* in the Rabbit.** *Amer. J. Trop. Med. & Hyg.* 1957, Jan., v. 6, No. 1, 32–49, 1 graph & 7 figs. [14 refs.]

A description is given of experiments in which 37 strains of *Entamoeba histolytica* isolated in culture from food handlers and hospital patients in

Memphis, Tennessee, were inoculated intracaecally into rabbits in order to determine the correlation between the symptoms observed in the human donors and the pathological effect produced in the recipient animals. The results of the experiments were assessed on autopsy carried out 14–20 days after inoculation, when the caecum was examined for lesions, sections of it were prepared for the study of pathological changes, and the size of the trophozoites was recorded.

5 of the strains examined, of which 4 were isolated from cases of amoebic dysentery, produced in 88·4% of 104 rabbits severe ulceration, with copious diarrhoea, loss of weight and numerous haematophagous amoebae. Another group of 14 strains, 2 of which originated from cases of amoebic liver abscess and 12 from symptomless infections, produced in 45·2% of 188 rabbits only small lesions without much loss of weight. Finally, 18 strains from symptomless cases proved to be non-pathogenic to 156 rabbits used.

While in most of the strains employed in these experiments the mean size of the trophozoites ranged from 12 to 18 μ, in 9 strains from symptomless carriers the mean measurements were from 7·5 to 10·0 μ, and the small amoebae proved to be more difficult to cultivate than the large ones. [It would seem, therefore, that at least some of the small strains were represented by *E. hartmanni*.] *C. A. Hoare*

Trans. Roy. Soc. Trop. Med. & Hyg. 1957, July, v. 51, No. 4, 303–31.
Symposium on the Laboratory Aspects of Amoebiasis. I. Introduction [Hoare, C. A.], 303–5, 1 fig. **II. The Laboratory Diagnosis of Clinical Amoebiasis** [Stamm, W. P.], 306–12, (16 refs.). **III. Virulence in** *Entamoeba histolytica* [Neal, R. A.], 313–19, 3 figs., (24 refs.). **IV. The Search for New Amoebicidal Drugs** [Woolfe, G.], 320–26, (16 refs.). Discussion 327–31 (21 refs.) [Fulton, J. D.; Woodruff, A. W.; Goodwin, L. G.; Walters, J. H.; Landquist, J. K.; Stamm, Neal & Woolfe (in reply)].

C. A. Hoare in introducing the symposium pointed out the many gaps in our knowledge of *Entamoeba histolytica* in respect of its host-parasite relationship, its physiology, and its aetiology as a disease-causing agent. Improved methods of animal experimentation are contributing to the solution of such problems. Differentiation of races of *E. histolytica* according to the size of the parasite suggests that the small-race strains are non-pathogenic while the large-race strains are potentially pathogenic. Recent work suggests that there also are minor structural differences between the two races; so the available data entitle the small-race parasite to independent taxonomic status either as a species (*E. hartmanni*) or subspecies (*E. histolytica hartmanni*). This distinction is however complicated by the existence of a dwarf strain of *E. histolytica*, which has not the structural characteristics of *E. hartmanni* [see Burrows, this *Bulletin*, 1957, v. 54, 1316].

W. P. Stamm dealt with the methods of search for *E. histolytica* in stools, with and without concentration techniques, and with the diagnosis of extra-intestinal amoebiasis. On consideration of the results of others, and from his own work, he concluded that 3 simple microscopical examinations of stools at intervals of 3 or 4 days should provide more positive results than examination of stools for 3 consecutive days; this may be due to a rhythm, or to random irregularity, in cyst excretion. Various concentration methods for cysts have been tried, but the results obtained with these have not, in the author's hands, proved materially superior to efficient direct microscopy in the disclosure of the infection. Preservation of stool specimens in MIF, or a similar fixative, is useful for delayed microscopical examination of specimens. The staining techniques so far advocated have not a great deal to commend them; culture also has proved disappointing. In the presence of *E. histolytica* in the stools it does not necessarily follow that symptoms and signs from which a patient may suffer are due to this infection. In a group of Pakistani aircraft apprentices 56% were proved infected with *E. histolytica*; this infers a true infection rate of about 70%; yet of 101 of these men proved to be infected only one suffered symptoms attributable to amoebiasis. Complement-fixation tests are non-specific and insensitive, and therefore of little value in the diagnosis of extra-intestinal amoebiasis. In 50% of European patients with amoebic liver infections parasites cannot be found in the stools; liver biopsy has no place in the diagnosis of this condition.

R. A. Neal, after considering various views on the virulence of *E. histolytica*, recorded experiments to determine this with strains isolated from man and kept in culture. Strains from human carriers (symptom-free) proved avirulent to young rats, while strains which had caused symptoms in man proved virulent to rats. Kittens are unsatisfactory experimental animals for the determination of virulence in view of their undue susceptibility to this parasite; strains found to be non-pathogenic to animals, such as monkeys, are pathogenic to kittens. No satisfactory deliberate infections of man with strains of parasites isolated from asymptomatic human carriers have so far been made. It is probable that the state of nutrition of the host affects the pathogenicity of the infection for man; this has been shown to be the case experimentally in animals. The influence of concomitant bacterial infections on pathogenicity also has been studied. The bacteria found with virulent strains of parasites have been introduced into animals infected with avirulent strains of parasites without influencing the pathogenicity of the latter; the converse also has been done, with a like result. Tissue invasiveness appears to be an attribute of the parasite independently of the associated bacterial flora; but bacterial concomitants, themselves non-pathogenic, do play an important part in the establishment and existence of *E. histolytica* infections in the guts of guineapigs. It appears that there are two morphologically identical large-race types of *E. histolytica*; one which is avirulent and remains so; the other is virulent but must at times be quiescent and

not produce symptoms, so enabling it to form the cysts necessary for its propagation. The existence of this quiescent period may account for the recovery from human apparent carriers of strains which prove virulent to animals. Experiments with rats are necessary to determine whether such a human case of infection is of the virulent or the avirulent type, and so whether treatment of the infection is necessary or needless.

G. Woolfe discussed the laboratory screening and subsequent selection for clinical test of speculative amoebicidal drugs. The first step is *in vitro* testing of the compound; then *in vivo-in vitro* testing; and finally a series of *in vivo* investigations. A micro-tube method of *in vitro* testing was adopted in his laboratory after it had been shown to yield reliable results with such well-recognized amoebicides as emetine, conessine and the iodohydroxyquinolines. The details of the procedure are described. The *in vivo-in vitro* tests also are briefly described; their aim is to effect economy in the use of both materials and animals. The *in vivo* tests, which follow when merited, are done first in weanling rats. Guineapigs have proved unsatisfactory; the recognized amoebicides are less effective in them than in rats and thus the results are erratic. Correlation between the 3 methods of testing advocated has been satisfactory, but care must be taken not to discard drugs in the initial test which on more elaborate testing may prove to be of value. The final assessment of the value of a drug must be clinical and in man.

In opening the discussion which followed these contributions, J. D. Fulton paid tribute to Dobell's initial work in the clarification of the amoebic protozoa which occur in the gut of man. He briefly summarized the progress of knowledge of these organisms, and of the methods of recognition of their presence in man. He was not prepared to subscribe to Stamm's view that the complement-fixation test was useless, and he did not accept without some reserve Neal's conclusion that virulence was solely an attribute of the amoeba; he referred to a number of studies by other workers which appeared to negate this view.

A. W. Woodruff, L. G. Goodwin, J. H. Walters, and J. K. Landquist also commented on the papers, and there were replies by the primary contributors. *A. R. D. Adams*

Amin, M. R., Linnell, W. H. & Sharp, L. K. **The Synthesis of Certain Bis*iso*quinoline Derivatives structurally related to Emetine.** *J. Pharmacy & Pharmacol.* London. 1957, Sept., v. 9, No. 9, 588–99. [14 refs.]

YAWS AND OTHER TREPONEMATOSES

Hackett, C. J. **The Transmission of Yaws in Nature.** *J. Trop. Med. & Hyg.* 1957, July, v. 60, No. 7, 159–68, 2 figs. [15 refs.]

A fuller understanding of the mode of transmission of yaws would help in the eradication of the disease. It is not known how treponemes are spread from the infective papillomata on the head, trunk and thighs to the sites, mainly on the lower limbs, where the initial lesions later develop. The possible factors and routes concerned in transmission are reviewed in detail in this paper. It is concluded from the evidence that transmission by means of inanimate objects and by insects is unlikely to be important. Simple contact does not appear to be the main mode of transference because most of the initial lesions are on the lower limbs and not on the body or upper limbs which would be most exposed to direct contact. Minor trauma, however, affects the lower limbs and probably facilitates the entry of the treponemes. The author thinks it probable that treponemes on and around itching papillomata are transferred on the finger tips of carriers to the hands of susceptible persons and thence to their limbs while they are rubbing traumatized areas. Before this theory can be accepted, investigations are required to determine minimal conditions for survival and the longevity of treponemes outside human tissues.

This is a valuable review of the epidemiology of yaws with numerous suggestions for filling in gaps in knowledge and elucidating modes of transmission. *T. H. Davey*

Walters, J. H. & Zahra, A. **The Aetiology of Dupuytren's Contracture in Eastern Nigeria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957. July, v. 51, No. 4, 346–52, 1 map & 1 fig. [10 refs.]

Contracture of the fingers into a flexed position but with the terminal interphalangeal joints extended is a clinical problem encountered in communities in which yaws is endemic. [Another is the depigmentation found in persons over 40 years of age.] The present study was made during the course of the [WHO/UNICEF joint assisted] mass treatment campaign in Nsukka [this *Bulletin*, 1957, v. 54, 689]. The prevalence of the contracture, which the authors call Dupuytren's contracture, increased with increasing age. In one area in children under 10 years of age it was 1·6% and over that age it increased from over 5% in the 11–18 age-group and to 9% over 18 years. In another group of villages no cases were seen in persons under 16 and not more than 0·5% in adults.

The fingers involved in order of frequency were the fifth, fourth and

third, and often the second. The contracture was usually bilateral and had a tendency to ulnar deviation. In advanced deformities a narrow subcutaneous fibrous ridge was found on the palmar surface of the proximal third of the affected finger. In attempts to straighten such a finger the tension on the thickened fascia often produced a dimple on the palm. No muscular atrophy, trophic changes or sensory loss were observed. Neither was analogous thickening of the palmar fascia observed [which is usually given in textbooks as the characteristic change of Dupuytren's contracture]. [Although the authors do not state so, the lesions they refer to are not necessarily associated with palmar hyperkeratoses.]

The possible cause of these contractures is discussed and the development of the bilateral deformity " quite early in childhood, would appear to exclude trauma ". The authors found that where yaws prevalence is high the contracture is frequent. Conditions favouring the dissemination of yaws " and possibly other unknown ones, have been diminished or removed in neighbouring but more socially advanced regions, with a marked lowering of the incidence of yaws among their inhabitants " and in these the prevalence of the contracture is also lowered. The authors refer to two tables which they say " show an association between yaws and Dupuytren's contracture, which in the absence of other possible aetiological factors peculiar to those villages where yaws is hyperendemic, must be significant ".

Serological studies of two groups, one of 46 patients with contractures and another, said to match the first in age distribution, of 60 without contractures, showed a highly significant difference in mean seropositivity. These studies are based upon scores of seropositives of the Kolmer, VDRL and Wassermann tests. " It is claimed that the result of the serological survey confirms the epidemiological evidence that yaws plays the leading aetiological rôle in the development of Dupuytren's contracture among the people " of the villages studied.

[It is not stated to which stage of yaws—that is, early or late—these contractures belong, nor what are the pathological changes that lead to them. There is no doubt that these contractures occur in communities in which yaws is endemic but not necessarily with equal frequency in populations with similar prevalences of clinically active yaws. The data of the patients in the serological studies are insufficient to allow an adequate restudy to be made, but it is doubtful if it is wise to use the data as the authors have done. They have shown that in populations with little yaws there are few finger contractures and *vice versa*, but correlation does not necessarily imply causation and in the former populations there are other variants than the prevalence of yaws, such as social advancement. It is hoped that this paper will stimulate other workers with opportunities to make further studies on the aetiology of the finger contractures that occur in people among whom yaws is endemic.]

C. J. Hackett

Bol. Oficina Sanitaria Panamericana. 1957, May, v. 42, No. 5, 411–66. Seminario sobre erradicación de treponematosis. (Excluyendo sífilis.) [**Seminar on the Eradication of Treponematosis, other than Syphilis**] Introducción, 411–12. Extensión del problema de la frambesia en las Américas [Bica, A. N. & Román, J.], 413–20. 1 map. Erradicación de las treponematosis con referencia especial a la erradicación de la frambesia en Haití [Samamé, G. E.], 421–31. [11 refs.] Las campañas de erradicación de treponematosis y su integración con otros programas de salud pública [Rodrigues, B. A.], 432–7. [11 refs.] Supervisión del personal de campo [Fausto, P. F.], 438–40. Trabajo de encuestas para determinar la prevalencia de pian sintomático en Haití [Morales G., J.], 441–4. Evaluación de los programas de erradicación de la frambesia [Smith, C. A.], 445–51. 2 figs. Informe final, 452–9. Dosis de penicilina indicadas en las campañas de erradicación de la frambesia. [Editorial.] 460–61. [See this *Bulletin*, 1957, v. 54, 961.]

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

East African Med. J. 1957, July, v. 34, No. 7, 289–407, illustrated. [Numerous refs.] **Tuberculosis and Leprosy Conference** [Himsworth, H., President] held at Dar es Salaam in January, 1957, and organized by the East African Council for Medical Research.

This number of the *East African Medical Journal* publishes a considerable part of the matter presented at the conference, which was organized by the East African Council for Medical Research. The papers read were nearly equally divided between the two diseases, and 4 were devoted to the consideration of various aspects of their mutual relationship. This abstract is confined to those dealing with leprosy. The chairman, Sir Harold Himsworth, found himself more impressed by the contrasts than by the resemblances of the two diseases. "I cannot help wondering if it might not be wise for us to try and abandon investigational policies based on the assumption of an underlying similarity between tuberculosis and leprosy and to pay more attention to the evident differences between these two conditions. In that way, at least, we shall approach the problem with an open mind." There was much discussion on the lepromin reaction and, though there was divergence of views, all were agreed that much more work was necessary before its value could be fully assessed.

In a joint paper by experts in tuberculosis and leprosy (J. A. Kinnear Brown, G. M. Short and W. Blenska, p. 339) the question of the value of BCG in the control of leprosy is discussed. After comparing the lepromin and tuberculin reactions the authors pointed out that mass vaccination with BCG would fail in the small number of people (9%) who most need protection, " who would need repeated vaccination, and who are the crux of the problem, for there is no means of discovering who they are ". To avoid many difficulties it would be better to organize trial of the effect of BCG in leprosy as a part of a tuberculosis campaign and as a joint operation with those concerned with the control of leprosy.

J. A. Kinnear Brown (p. 351) discusses the indications that inbreeding increases the prevalence of leprosy in certain areas, and asks if sensitivity and resistance to leprosy in certain persons might not be related to genetic factors. In this connexion the chairman recalled the work of Kaplan on genetic characters determining susceptibility to infection by the tubercle bacillus, but, he added, " I do not think it would be wise to assume that one was dealing with a simple genetic character ".

S. W. A. Kuper (p. 349) gives a summary of a preliminary report on hypersensitivity in tuberculosis and leprosy. No correlation between the two sensitivities was found in 114 healthy subjects, nor in 102 leprosy patients tested, but a positive correlation was clearly shown in 57 patients with pulmonary tuberculosis. With 6 antigens (human and avian tuberculin, killed tubercle bacilli, lepromin and 2 fungal mycobacteria), the 48-hour reactions of the first 3 showed high correlation and a positive correlation with lepromin in normal and tuberculosis groups but not in the leprosy groups.

A paper on the experimental approach by R. J. W. Rees (p. 361) deals with the measurement of infection on a quantitative basis, and gives evidence *in vivo* of factors which enhance the rate of growth of the leprosy bacillus. By means of a standard mouse test, a number of current anti-tuberculosis drugs have been tested against experimental *Myco. lepraemurium* infection. Of particular interest is the powerful anti-leprous effect of macrocylon, a surface-active polyoxyethylene ether. This substance is being tested on monkeys, and if these tests are successful it should soon be ready for testing in man.

R. G. Cochrane (p. 363) discusses the comparative significance of leprosy and tuberculosis in the overall health problems of tropical Africa. He emphasizes the need to integrate the control of leprosy into the whole public health scheme, and shows how " this disease can be used as a handmaiden for basic, or fundamental research ".

J. A. Kinnear Brown (p. 373) compares the control of leprosy in rural areas as it is found in Uganda with its control in Nigeria where he originally worked. He recommends particularly the " treatment village " which makes regular treatment possible for patients widely scattered over sparsely populated areas such as those in Uganda. Other advantages are that the chance of spreading infection is less and " it provides a useful

social life for a class of people who could easily become apathetic" and promotes communal effort to prevent as well as cure the disease.

H. W. Wheate (p. 377) also gives his experience of leprosy control in south-west Tanganyika. Lepromatous patients are as far as possible admitted to the leprosarium, while those with other types are treated at clinics. He lays particular stress on the careful choice of African staff and their thorough training.

W. A. A. Hodges (p. 381) writes on surgical decompression of nerves affected by leprosy, particularly the ulnar and lateral popliteal. He has operated on some 200 patients and considers that better and more lasting results are obtained in this way than by the use of hydrocortisone infiltration. "The decompression should consist in the removal of the entire perineurium over the length affected including the perineurium of individual nerve bundles if these are involved." He also considers the question of nerve transplantation.

A. R. Davison (p. 385) writes on chemotherapy of leprosy in South Africa. He favours oral DDS with a weekly dose of 300 to 1200 mgm. With patients who live at a distance it may be necessary to use weekly injections of DDS suspension. He uses thiosemicarbazone only as an interim medicament when DDS cannot be used. He reports trials with streptomycin, mepacrine, chloroquine and trivalent antimony without any definite results though streptomycin gave temporary improvement. He has found cortisone and corticotrophin valuable in erythema nodosum leprosum, leprous neuritis and other forms of lepra reaction and exacerbation of existing lesions. He finds injections of ethyl esters of hydnocarpus oil useful more for their cosmetic than their curative effect in tuberculoid leprosy.

W. Harden-Smith and M. Smith (p. 391) report that with an average weekly dose of 0·25 gm. of DDS 74% of 190 out-patients with tuberculoid lesions cleared up (30%) or improved in a period of about 14 months.

J. Ross Innes, M. Smith and W. Harden-Smith (p. 395) report on their trials with SU 1906 in 43 patients after nearly 6 months, that absorption from the gut is not satisfactory, most of the drug being recoverable in the stools; that it does not appear in the blood in quantities of the same order as sulphonamide or sulphone; that it appears in the body fluids as a solubilized derivative; and that because of the large bulk of the dose administration is not as convenient as with DDS. The clinical effects appear to be similar to those with DDS. *Ernest Muir*

Letichvskaia, A. [**Disturbance of Temperature and of Electrical Resistance in the Clinically Healthy Parts and the Affected Parts of the Skin, in the Initial Stages of Leprosy**] *Sbornik Nauchnykh Rabot Po Leprologii i Dermatologii.* 1956, No. 8, 105–9. [In Russian.] French summary. Rostov-on-Don: Experimental and Clinical Leprosarium of the Ministry of Health of the U.S.S.R.

The author, after reviewing various methods of early diagnosis of leprosy, considers that these are not adequate. She therefore puts forward a new method which consists of measuring the local temperature of the skin, and the degree of sweating as measured by skin resistance to an electric current. A specially designed instrument (ohmmeter) is used, which was built in the experimental laboratories of the Institute of Neurology of the Academy of Medical Sciences of the U.S.S.R. The patient must be resting in a room with a constant temperature of 20° to 22°C. The temperature and electro-resistance are measured over a period of 2 minutes, and in the morning before taking food. Examinations were made in 73 leprosy patients of whom 13 were tuberculoid, 14 lepromatous, and 46 undifferentiated.

The following results were obtained: on erythematous hypopigmented spots with clear outline, skin temperature was raised but electro-resistance lowered (corresponding to increased sweating); on erythematous hypopigmented spots with a cyanotic and not clearly defined margin, the temperature was lowered but electro-resistance raised; in hypochromic and in dystrophic patches the temperature was lowered and electro-resistance raised. In invisible patches which could be made visible only by using the nicotinic acid test (intravenous injection of 5 to 10 ml. of a 1% solution of nicotinic acid) a rise of temperature and a lowering of electro-resistance could be observed in some cases.

It is considered that by this instrumental method the presence of autonomic changes can be revealed in early leprosy, and that this is a valuable diagnostic method. *Ernest Muir*

Kent, J. F., Otero, A. G. & Harrigan, R. E. **Relative Specificity of Serologic Tests for Syphilis in *Mycobacterium leprae* Infection.** *Amer. J. Clin. Path.* 1957, May, v. 27, No. 5, 539–45. [30 refs.]

These authors submitted 34 sera from patients suffering from leprosy to 7 different serum tests for syphilis including VDRL, Kline, Rein-Bossak, Mazzini and Kahn flocculation and Kolmer and CF52 complement-fixation tests. The patients included 28 with the lepromatous, 4 with the tuberculoid and 2 with the neural form of leprosy; all gave negative TPI reactions and were free from anamnestic and clinical evidence of syphilis.

Of the 34 sera 11 were reactive or weakly reactive in the VDRL test, 9 in the Kline, 11 in the Rein-Bossak, 8 or 17 (according to the lecithin content) in the Kolmer (with cardiolipin), 7 in the CF52, 20 in the Mazzini, 21 in the Kahn and 6 in the Kolmer (with lipoidal antigen).

Thus it will be seen that tests with lipoidal antigen tended to give more reactions than those with cardiolipin; in addition in the latter it was found that the greater the content of lecithin the less the tendency to reactivity.

T. E. Osmond

Collier, W. A., Bueno de Mesquita, S. J. & van Zanten, E. **Quantitative Complement Fixation and Lepromin Reaction in Tuberculosis.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Sept., v. 9, No. 3, 261–8, 4 diagrams.

Using the tuberculosis antigen Essen from the Behring works, the authors performed the complement-fixation reaction in 122 tuberculosis patients living in a region where leprosy was endemic. As controls they used 219 patients with lepromatous leprosy, and 52 healthy soldiers recently arrived in Surinam from Europe. The titration of the amboceptor was carried out as in the Wassermann test.

Of the tuberculosis patients 20% were negative, 34% positive, and 46% strongly positive. Of the leprosy patients 14% were negative, 19% positive, and 67% strongly positive. Of the healthy controls 94% were negative, and 6 positive.

In addition, the Fernandez and Mitsuda reactions were tested in the first two groups. In the tuberculosis group the Fernandez reaction was negative in 20% and the Mitsuda in 10%. In the leprosy group the Fernandez reaction was negative in 61%, and the Mitsuda in 79% [a remarkably low proportion of negatives in active lepromatous leprosy].

The impression was gained that tuberculosis infection markedly increases reactivity to the Mitsuda test. "Patients with a high antibody titre tend to develop a strong Mantoux reaction. An analogous correlation exists between the Mantoux and the Mitsuda tests." *Ernest Muir*

Rodriguez, J. N. **Leprosy Control in the Province of Cebu.** *J. Philippine Med. Ass.* 1957, June, v. 33, No. 6, 444–50, 1 fig.

An account is given of the methods used for the control of leprosy in the 53 municipalities of the Province of Cebu in the Philippines during 2 periods: 1904 to 1929 and 1930 to 1955. The following units were used: a children's sanatorium with a capacity of 1,300 beds; a stationary skin clinic with an average yearly admission of 200 new cases; and a travelling skin clinic which discovered 155 new cases of leprosy in the last year.

On January 1, 1957 there were 2,749 registered cases of leprosy, of which 1,114 were bacteriologically positive. The incidence rate for the province is 2·37 per 1,000 which is "more than twice the calculated incidence for the whole of the Philippines". Leprosy in Cebu is, however, diminishing. There were 5,290 admissions during the period 1904–29, but only 2,882 in 1930–55, a reduction of 54%.

It is considered that treatment is now the basis of leprosy control, and should be extended to all leprosy patients, early voluntary presentation of cases being encouraged. *Ernest Muir*

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—Trematodes (*schistosomes, other flukes*); Cestodes (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); Nematodes (*Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

Marill, F. G. Diffusion de la bilharziose à " Schistosoma haematobium " en Haute-Volta. [**Distribution of** *Schistosoma haematobium* **Infection in the Upper Volta Region, French West Africa**] *Bull. Acad. Nat. Méd.* 1957, v. 141, Nos. 19/20, 398–401.

A brief survey of schistosomiasis in the district of Houndé is reported here. The area covers 3,400 sq. km. and contains some 25,000 inhabitants living in 51 villages. Examination of the urines of 1,308 persons, mostly between 5 and 15 years of age, in 19 localities revealed *Schistosoma haematobium* ova in 409 (31·2%) and red cells without ova in 33. The disease was present everywhere but the incidence of infection in different villages varied widely, reaching almost 100% in some. All the 23 water points still existing in the middle of the dry season were examined for snail vectors, and *Biomphalaria* and *Bulinus* were found together in 12 of them, the former alone in 4 and the latter alone in 1. Infection rates with furcocercous cercariae ranged up to 20% in the snails.

In the region of Bobo-Dioulasso 22 possible habitats were searched and vector molluscs were collected on 14 occasions. The author contends that it is no longer justifiable to refer to " foci " of schistosomiasis in the Upper Volta area, since it is becoming clear that the voltaic plateaux from the Niger to the Sudan form a vast area of endemicity of schistosomiasis in which there exist certain localities with exceptionally high incidences of infection. *T. H. Davey*

El-Gindy, M. S. **Distribution and Ecology of the Snail Vectors of Schistosomiasis in Egypt.** *J. Egyptian Med. Ass.* 1957, v. 40, Nos. 3/4, 192–204. [28 refs.]

The extent of the distribution of *Biomphalaria boissyi* in Egypt and its prevalence in endemic areas of intestinal schistosomiasis have not hitherto been determined. This report throws light on both problems; it also refers briefly to the localities in which *Pyrgophysa* [*Bulinus*] *forskali* is found and comments on factors in the ecology of Egyptian vectors of schistosomiasis.

B. boissyi has a much more limited distribution than *Bulinus*. It was not thought to occur south of Cairo but it has recently been discovered in the Provinces of Giza, Beni Suef and Fayoum; control measures have eliminated it from the last two. Its greatest prevalence is in the triangle of the Delta including Alexandria and Rosetta. In the southern part of

the Delta this species is scanty, and it is absent south of Kom Hammada town in Beheira Province. On comparing the 1952 figures for *B. boissyi* prevalence in various areas with the local incidence of *Schistosoma mansoni* infection estimated in 1937, it is concluded that vector prevalence and disease incidence are directly related. It is interesting to note that for the first time *B. boissyi* has been captured in the Nile near Cairo, and reinfestation from the Nile of a drain freed from snails by molluscicides has also occurred. *P. forskali* is reported from drains and small canals in 6 provinces. Brief comments are made concerning the following ecological factors: natural enemies, aquatic vegetation, pollution, current, desiccation, shading, temperature, turbidity, salinity and *p*H. The findings do not differ materially from those of other workers. [This paper would have been much improved by the inclusion of a map indicating the localities mentioned.] *T. H. Davey*

Halawani, A. **Mass Treatment and Control Service of Schistosomiasis and Endemic Diseases in Egypt.** *J. Egyptian Pub. Hea'th Ass.* 1957, v. 32, No. 3, 123–35.

Control of endemic disease in Egypt started in 1921, and as it developed, different sections became responsible for each new project. A new organization has been built up for rural areas in which a single unit is responsible for control of schistosomiasis and malaria and for environmental sanitation in villages.

Measures for the control of schistosomiasis are health education, general and specific sanitary measures, snail control by improved irrigation engineering and specific biological and chemical measures, and mass treatment. Health education is undertaken by a health cooperative society established in each village. Sanitary measures involve the provision of a good water supply and the introduction of bored-hole latrines for villagers and septic tanks in the better houses and public institutions. Irrigation canals are improved by re-grading their sides, their banks are stone-faced to control vegetation and snail propagation, and where they pass through villages they are filled, diverted or piped through. Snail control is by weeding the canals and the use of molluscicides. Over a period of years some 4,000,000 acres have been treated with a total of 1,725 tons of copper sulphate and the intensity of snail infestation has been reduced from 32 to 5 *Bulinus* per 100 dips. In the Dakhla Oasis combined mass treatment and snail control have reduced the human infection rate from 65% in 1926 to 3% in 1954. The present policy is to identify foci of transmission by examination of snails for cercariae and to treat areas thus found infected, together with snail-infested canals around villages. Mass treatment of schistosomiasis is by the use of trivalent antimony compounds and results are satisfactory with a course of between 425 and 484 mgm. of antimony for patients of 60 kgm. body weight.

Miracil D in dosage of 200 mgm. thrice daily for 20 days gives a cure rate of 75% in *Schistosoma haematobium* cases.

In addition to the measures employed against schistosomiasis, the control teams examine and treat all helminth infections, including filariasis, and they apply DDT to the houses for malaria and filariasis control. Environmental sanitation is undertaken by the rural councils. Research is being actively pursued and the campaign against endemic disease is being intensified by increasing the number of control units and by providing larger funds for control and treatment. *T. H. Davey*

Anais Facul. Med. Univ. do Recife. 1956, Dec., v. 16, No. 2, 113–68, numerous figs. [Numerous refs.] English summaries pp. i–v.

Aspectos da patologia da esquistosomose mansônica. [**Aspects of the Pathology of *Schistosoma mansoni* Infection**]

This is a symposium of 7 papers on the pathology of *S. mansoni* schistosomiasis in which a group of well-known Brazilian workers review the literature and give summarized accounts of their own studies. With much of this work readers of this *Bulletin* will be familiar [see, for example, 1954, v. 51, 70; 1955, v. 52, 175; 1956, v. 53, 1250; 1957, v. 54, 711, 715]. The present papers contain closely-described pathological details and only the main points can be abstracted here: but the many photomicrographs with which the papers are illustrated will prove informative to those who cannot read the Portuguese text.

The first 3 papers are by R. de Barros Coelho and deal respectively with the histogenesis of the schistosomal granuloma, the pathogenic action of the schistosome eggs in the intestine, and in the liver. The first has already been abstracted [*ibid.*, 1957, v. 54, 711]. The second discusses the extrusion of the eggs into the intestinal lumen in man and in a number of experimental animals. In the third paper the author argues that the effect of the eggs in the liver is strictly focal, it does not produce obvious disturbance of the intra-hepatic portal circulation and does not cause diffuse hepatic fibrosis. The reactional granuloma around the eggs almost disappears after the irritating substance from the miracidium has been removed and the fibrous nodule formed sometimes disappears completely. Recanalization takes place and re-establishes the blood flow to the interlobular venule.

In the fourth paper, H. Menezes discusses the literature and describes his own studies of the myocardial lesions in *S. mansoni* schistosomiasis. True myocarditis is a very rare focal lesion due to the eggs in the myocardium or to the necrotic action of dead worms in branches of the coronary vessels, the last-named being excessively rare. No statistical correlation could be found between *S. mansoni* infection and diffuse myocardial infiltration. For example, in 100 autopsies in such infections in Recife, 25% showed myocardial infiltration and in only 2 instances

were there lesions caused by the eggs: in 108 control patients such a myocardial infiltration was present in 23·8%. The results were confirmed by animal experiments.

In the fifth paper E. M. Coutinho describes experiments on a variety of animals to determine the pathology of hepatic and pulmonary lesions found in infections with both sexes of *S. mansoni* and in animals infected only with male worms. He concludes that, contrary to the observations of other workers, these lesions are attributable not to toxins elaborated by living worms, but always and at every stage to association with autolytic products of dead worms.

In the sixth paper, A. Magalhães, Jr. reviews the literature on the presence of dead worms in relation to hepatic lesions. His final conclusion from this and from his own studies is that the "clay-pipe-stem cirrhosis" of Symmers is typical of schistosomiasis.

The final paper, by V. Pessoa and H. Menezes, is written in English. They describe experiments, in guineapigs treated with antimony, on the action of cortisone on the liver lesions produced by dead schistosomes. Two months after infection was confirmed, the animals were treated in 3 groups: (1) 10 with antimonyl sodium tartrate, (2) 3 with cortisone, (3) 12 with both drugs simultaneously. The results showed that necrotic areas were smaller in the animals treated with cortisone; and leucocytic infiltration was less. In groups (2) and (3) mobilization of macrophages was increased but actual phagocytosis diminished; collagen formation was delayed and reduced. In animals treated with cortisone, parenchymatous degeneration unrelated to dead worms was often found. The authors were unable to form final conclusions on the use of cortisone in schistosomiasis. "It seems, however, that it aggravates more than improves the evolution of the disease." *H. J. O'D. Burke-Gaffney*

Pellegrino, J. & Nunes, Rosa M. B. Técnica de obtenção de cercárias dessecadas de *Schistosoma mansoni* para o preparo de antígenos. [**Technique for obtaining Dried Cercariae of** *S. mansoni* **for the Preparation of Antigens**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1956, Apr., v. 8, No. 2, 397–404, 1 fig. [16 refs.] English summary.

The technique of freeze-drying has been applied to the cercariae of *Schistosoma mansoni* for the preparation of antigens. The cercariae used in this work were obtained from naturally infected snails; the cercarial suspension was filtered through gauze to remove large debris and snail faeces, and the initial concentration was obtained by passing the suspension through medium porous disks in Büchner funnels. The cercariae were then immobilized by placing the suspension in sedimentation flasks in a refrigerator for 3–24 hours, the supernatant fluid was drawn off and the concentrated cercariae were transferred to small

beakers and then placed in containers with solid carbon dioxide. The frozen cercariae were then transferred to desiccators containing calcium chloride and dried under vacuum. The dried material was subsequently sealed in glass ampoules in a vacuum and these were stored in a refrigerator.

Figures are given for the yield in dry weight of cercariae from various numbers of infected snails but no data on the amount of contamination and relative antigenic activity of this material compared with that prepared by other techniques are given, although in the introduction a summary of these other methods is made. *C. A. Wright*

Pellegrino, J., Paulini, E., Pompeu, J. M. & Macedo, D. G. A reação intradérmica, na esquistossomose, com uma fração polissacarídea isolada de cercárias de *Schistosoma mansoni*. [**Skin Test in Schistosomiasis with a Polysaccharide Fraction extracted from Cercariae of** *Schistosoma mansoni*] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1956, Dec., v. 8, No. 2, 559–69, 1 fig. [11 refs.]

The English summary appended to the paper is as follows:—

"There was made a comparative study on two types of antigens prepared with cercariae of *Schistosoma mansoni* using a) a total extract and b) a polysaccharide fraction isolated according to Fuller's technique. The intradermal test was performed with the two antigens in the same group of 50 adult patients with *S. mansoni* eggs in the feces. The polysaccharide fraction was chemically tested and showed no reducing substances which appeared only after acid hydrolysis. In paper chromatography using phenol-water evidence of a single fraction was found. The intradermal test was performed on the flexor surface of the forearm. A volume of 0·05 ml for all concentrations of the antigens (10^{-3} to 10^{-7}) was injected. After 15 minutes the limits of the papulae were outlined with ink and transferred to a slightly wet absorbent paper by pressing it over the papulae. The areas of the papulae were determined with a planimeter.

"For all the concentrations the mean areas obtained with the polysaccharide fraction were smaller than those with the total antigen. Only the two highest concentrations (10^{-4} and 10^{-3}) of the polysaccharide fraction gave appreciable responses whereas the total antigen provoked reactions starting at the concentration of 10^{-6}. In the later instance the relation between the mean areas and the log of the concentrations of the antigen is linear within the range of concentrations tested (10^{-7} to 10^{-3}).

"The results indicate that the polysaccharide fraction isolated from cercariae of *S. mansoni* according to Fuller's technique is not the only active part in inducing skin reactions."

Pellegrino, J. & Macedo, D. G. Novo critério de leitura da reação intradérmica na esquistossomose. [**A New Criterion for evaluating the Results of the Intradermal Test in Schistosomiasis**] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1956, Dec., v. 8, No. 2, 543–57, 1 fig. [33 refs.]

The English summary appended to the paper is as follows:—

"It was proposed to evaluate the results of the intradermal test in schistosomiasis by measuring the area of the papulae by means of a planimeter or by a simplified method described in the paper. Fifteen minutes after the injection of the antigen the limits of the papulae were outlined with ink and transferred to a slightly wet absorbent paper pressed on the papulae. The measurement of the recorded areas could be easily carried out by any of the given methods. The reactions were classified as negative (areas up to 0·9 sq. cm), doubtful (areas of 1·0 and 1·1 sq. cm) and positive (areas of 1·2 sq. cm or more). It was claimed that the described criterion will represent a necessary step for the standardization of the skin test in schistosomiasis."

Di Egidio, M. Osservazioni radiologiche sulla bilharziosi intestinale nello Yemen. [**Radiology of Intestinal Schistosomiasis in the Yemen**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1957, June, v. 38, No. 6, 311–27, 12 figs. [10 refs.] English summary.

The author is the Director of the radiology department of the Royal Ahmed I hospital at Taiz, and here gives the radiological findings in 456 persons. He first points out that intestinal schistosomiasis is widely diffused throughout the Yemen and states that 2,500 specimens of faeces were examined in the hospital laboratory between April 1954 and February 1956 and ova of *S. mansoni* were found on 666 occasions.

Of the 456 persons examined by X-ray 190 showed mucous colitis. Radiological details of 60 patients, 40 men and 20 women, are given, all of whom had a barium meal and 56 a barium enema also. The ages of the patients varied from 15 to 70 years. The colon was normal in only 17, and the main findings were:— intense spasm especially of the transverse, descending, and sigmoid colon, severe pain on palpation particularly of the transverse and descending colon, no obvious alteration of the upper parts of the intestinal tract. Barium enema showed oedema of the mucosal folds, loss of, or spastic haustration in, the descending and sigmoid colon. Special mention is made of the fact that filling defects due to schistosomal papillomas, as described by many authors, were never found. The discrepancy is considered by the author to be due to the fact that in the Yemen the disease is caused exclusively by *S. mansoni*. There are some excellent radiographs. *W. K. Dunscombe*

Abdel Fattah Mostafa Mohamed. **Schistosomiasis of the Conjunctiva. A Case Report.** *Bull. Ophthalm. Soc. Egypt.* 1956, v. 49, 120–24, 4 figs.

"The author describes a case of bilharzia of the conjunctiva. The patient, a girl 4 years old, had a granuloma of the caruncle, which was removed and on pathological examination proved to contain bilharzia ova in different stages of degeneration. The adult worm was not found in the sections."

Ishak, K. G. **Adenocarcinoma of the Head of the Pancreas associated with *S. mansoni* Infestation. Report of a Case.** *J. Egyptian Med. Ass.* 1957, v. 40, No. 1, 59–63, 4 figs. on 2 pls.

"1. The clinical picture and management of a case of carcinoma of the head of the pancreas presenting with jaundice is discussed.

"2. The gross and microscopic pathology is reported on, the tumour being an adenocarcinoma of ductal origin associated with *S. mansoni* infestation.

"3. Two other pancreatic carcinomas previously reported in the literature, and associated with schistosomiasis, are commented on.

"4. It is the opinion of the author that the finding of schistosome ova in this case of adenocarcinoma presented is co-incidental."

Ibrahim, H. **Combined Ligation of Hepatic and Splenic Arteries in Egyptian Splenomegaly.** *J. Egyptian Med. Ass.* 1957, v. 40, Nos. 3/4, 253–69. [12 refs.]

"The situation can be summarised as follows:—

"1. Ligation of the hepatic artery is safe in cases of Egyptian splenomegaly.

"2. Ligation on the whole has no effect on the liver function.

"3. Ligation on the whole has no effect either on the blood protein level or the albumen-globulin ratio.

"4. Ligation causes marked drop in portal tension.

"5. Ligation has a very favourable effect on ascites. Apparently the mechanism of resolution of ascites is not through alterations in the blood proteins, or improvement in the liver function. Probably ligature diminishes lymphatic congestion in the liver.

"6. The operation is a simple procedure compared with shunt operations; and under the circumstance of bilharzial infection it is preferable to these operations.

"7. In the majority of the cases reported, the operation was performed in non-ascitic cases as a prophylactic measure. Its prophylactic value however cannot be gauged without an adequate observation period of at least ten years. But whereas the operation is of definite value in cases

of established ascites, the author is of the opinion that, at present, the operation should only be done when this complication sets in.

"8. As reduction of the size of the spleen occurred in very few instances, and as this organ continues to be the source of discomfort to the patient, and itself is not so important in bringing about a maximal fall in the portal tension, I think it is advisable to perform splenectomy. Splenectomy also produces a permanent cure of hypersplenism; it should be done at least two months after hepatic artery ligation to avoid an unduly high mortality."

KHAIRY, M. **Hepatic Artery Ligature for Liver Cirrhosis in Egypt.** *J. Egyptian Med. Ass.* 1957, v. 40, No. 6, 396–409, 22 figs. on 12 pls. [10 refs.]

"A limited series of 13 cases of Egyptian hepato-splenomegaly treated by Hepatic Artery Ligature with or without splenectomy are discussed. The mortality is about 23% due to burst abdomen and bleeding, but not a single case of gross liver necrosis and failure. The mortality is less after the two-stage operations had been carried out. The result of the operation on ascites, hypersplenism and liver function are discussed. Although it gave encouraging results, yet the final word either for or against the operation should be postponed for further studies and application in a greater number of cases and with a longer follow up."

GORVIN, J. H., RAISON, C. G., SOLOMON, W., STANDEN, O. D. & WALLS, L. P. **The Action of Substances Analogous to Diaminodiphenoxyalkanes against** *Schistosoma mansoni*. *Brit. J. Pharmacol. & Chemotherapy*. 1957, Sept., v. 12, No. 3, 329–35.

"The effects on activity against *Schistosoma mansoni* of further modifications of the diaminodiphenoxyalkanes are reported. Replacement of the amino-group by any of a large number of other groups destroys activity. Activity is retained in the presence of certain substituted (hydroxyalkyl, carboxyalkyl) amino-groups and in some of their aldehyde-bisulphite derivatives. Many variations of the central chain lead to compounds of reduced activity, the outstanding exceptions being a number of but-2-ene derivatives, which retain full activity."

[See this *Bulletin*, 1957, v. 54, 313 *bis*.]

OZAWA, K. **Studies on the Therapy of Schistosomiasis Japonica. Report No. 1. On the Fate and Distribution of Antimony in the Body under the Ordinary Treatment with Sodium Antimonyl Tartrate.** *Tohoku J. Exper. Med.* 1956, Dec. 25, v. 65, No. 1, 1–9, 4 figs. [21 refs.]

Antimony was estimated by the methods of MAREN and FREEDMAN. 4 goats were given sodium antimonyl tartrate intravenously in single

doses of 1·02–1·7 mgm. Sb/kgm. One hour later the blood concentration was 0·3–0·5 μgm. per ml., 12 hours later 0·1 μgm. and 24 hours later 0·06–0·07 μgm. 3 patients were given 20·4 mgm. Sb intravenously and the mean blood concentrations were 0·52 μgm. per ml. after 1 hour and 0·07 μgm. after 48 hours. When the injections were repeated every 48 hours for 21 doses the 1-hour value increased a little after the first 4 injections and then gradually decreased; after 21 injections the 1-hour value was 0·32 μgm. and the 48-hour value 0·08 μgm. When rabbits were treated with the same doses (1·02 mgm. Sb/kgm.) the concentration of Sb in the blood of the portal vein was 2·3 times as high as that in peripheral veins at 1 hour and 4·1 times higher after 24 hours, and these higher concentrations were maintained throughout the 21 subsequent doses. The concentration of Sb in blood cells was higher than that in the plasma after 1 hour and decreased after 10 hours. The amount excreted in urine of patients amounted to 3·8% of the dose in 6 hours and 9·2% in 24 hours; small amounts were still being excreted after 86 days. In the faeces of patients there was 0·8% of the dose after 2 hours, and 1·4% after 24 hours. In the saliva 0·2 μgm. Sb was excreted after 1 hour, 0·4 μgm. after 3 hours, 0·6 μgm. after 6 hours, 1 μgm. after 48 hours and 0·1 μgm. after 120 hours.

When rabbits were given a single injection of 1·02 mgm. Sb/kgm., the liver contained 9·3 μgm./kgm. after 2 hours, 12·6 after 24 hours and 5·5% after 48 hours. The other organs (in descending order) found to contain Sb included spleen, kidney thyroid, small intestine, fundus of stomach, heart, large intestine, lung, cerebrum, and adrenal. About 4·5 μgm. per ml. were found in the bile and 1 μgm. per ml. in the contents of the stomach. After 8 injections the concentration in the liver increased to 22 μgm. per ml. and 24 hours after the 21st injection it was 40 μgm. Apparently antimony is absorbed mainly from the small intestine and is excreted from the kidney, liver, stomach and salivary glands. There is little in the breast or in milk.

[A good paper with many useful data about the distribution and excretion of antimonials.] *F. Hawking*

Ozawa, K. **Studies on the Therapy of Schistosomiasis Japonica. Report No. 2. On the Sb Concentration in Blood and the Sb Distribution in Organs during the Intensive Treatments of Goats and at the Sb Poisoned Death of Rabbits and on the Effects of Bal and Hypo as Sb Antidotes.** *Tohoku J. Exper. Med.* 1956, Dec. 25, v. 65, No. 1, 11–21, 2 figs. [23 refs.]

3 rabbits were given sodium antimonyl tartrate intravenously in toxic doses of 0·05 gm./kgm. (17 mgm. Sb/kgm.) and died in 1–1·5 hours; 3 others were given 0·02 gm./kgm. (6·8 mgm. Sb/kgm.) and died in 22–24 hours. The antimony content of the different organs was determined

and compared with the content found after the normal course of treatment [see above]. The concentration in the spleen was 8–11 times higher, in heart 10–60 times, in kidney 7–14 times and in lungs 12–25 times. On the other hand that in the liver was only twice as high (72 μgm./gm.). When 20 mgm. BAL was injected intramuscularly into 4 rabbits receiving the routine course of treatment, the concentration of antimony in the liver was only 0·4 times the normal value but that in the other organs was little affected. 5 rabbits were given a lethal dose of antimony (0·02 gm./kgm.) together with 0·4 gm. sodium thiosulphate and 3 doses of 40 mgm. BAL intramuscularly at 3-hour intervals. None of these rabbits died or showed symptoms.

2 goats were given 3 mgm./kgm. sodium antimonyl tartrate intravenously 3 times a day and 2 others were given the same plus BAL and sodium thiosulphate. The blood concentrations of antimony in the latter were always a little higher than in those without antidotes [differences not striking].

2 goats and 4 rabbits were treated intravenously with 3 mgm./kgm. 4 times daily at 3-hour intervals for 2 days. The blood concentration rose to 1·1 μgm. Sb/ml. after the last dose, but then rapidly diminished. 2 other goats were given 3 mgm./kgm. once daily for 12 days and the blood concentration 1 hour after the last injection was 0·8 μgm. Sb/ml. and 0·46 μgm. Sb/ml. after 24 hours. Various other data are given about the concentrations of antimony in the blood and organs of these animals, for which the original paper should be consulted. *F. Hawking*

Chu, Shih-Huei. **Chloroquine in the Treatment of Clonorchiasis. A Report of 90 Cases.** *Chinese Med. J.* Peking. 1957, June, v. 75, No. 6, 473–84.

Clonorchiasis is endemic in Southern China, especially in Kwangtung Province. A wide range of therapeutic agents including the standard vermicides, emetine, antimony salts and organic arsenicals have all proved ineffective, but chloroquine has been reported to be a specific remedy in paragonimiasis; it has therefore been chosen by the author for trial in 90 cases of clonorchiasis. Previous reports on its effectiveness in small numbers of cases of this infection have been equivocal [this *Bulletin*, 1950, v. 47, 56; 1956, v. 53, 76].

Of the 90 patients, 72 were males and 18 females. Most of them were adults. Estimations of the daily output of ova in the stools were made in 80 cases by the Stoll technique. In a few cases, egg counts were also performed in aspirated duodenal contents, since this method, when tolerated by the patient, is considered to provide a more reliable index of intensity of infection. Symptoms comprised abdominal discomfort, hepatic pain and dyspepsia; in 3 cases cirrhosis of the liver was evident.

The preparations used, of English manufacture, bore the trade name of

Iroquine; each tablet of 0·2 gm. contained 0·124 gm. of the base. Four dosage regimens were employed, as under [dosages evidently refer to the salt]:

I. 0·2 gm. twice daily or 0·4 gm. per day;
II. 0·2 gm. thrice daily or 0·6 gm. per day;
III. as in II for 2 weeks, then increased to 0·8 gm. daily;
IV. 0·25 gm. twice daily for 2 weeks, then increased to 0·25 gm. thrice daily or 0·75 gm. per day.

The dosage was apparently not standardized to body weight. The duration of treatment was limited to 50 days, or was terminated 3 days after clearance of ova from the stools in those who responded more rapidly. 76 patients (84·4%) completed the prescribed course and ceased to pass *Clonorchis* ova, but treatment was discontinued in 1 case of pregnancy, in 2 patients owing to severe side-effects and in 2 of the 3 patients with cirrhosis, who showed no response after a total dosage of 15 gm. The remainder defaulted. Successful therapy was indicated by degenerative changes in the ova and by a falling eosinphil count, while clearance of the stools of ova was accompanied by relief of alimentary symptoms and of hepatic pain.

Follow-up examinations of the stools could only be achieved in 32 patients, of whom 11 showed a return of ova within 1 to 12 months. Whatever the dosage used, there was a direct relationship between the time taken to eliminate ova from the stool and the initial egg load. Of the 4 regimens described, numbers II and III appeared more effective than I and IV. Side effects comprised digestive disturbances, insomnia, headache, vertigo and skin eruptions; they were alleviated to some extent by the administration of glucose and vitamin B complex.

In a brief addendum the results of experimentation on cats infected with *Clonorchis* are reported. Living adult worms were demonstrated in the bile ducts of cats given lethal doses of chloroquine, and the drug did not seem to diminish the egg output.

[This paper is of value to clinicians in Britain, for clonorchiasis is not uncommon among Chinese visitors from Hong Kong.] *J. H. Walters*

Nishimoto, M. & Sakamoto, Y. [**On the Investigation of Paragonimiasis in Takaoka-cho, Kochi Prefecture**] *Shikoku Acta Med.* 1957, May, v. 10, No. 5, 11–15. [In Japanese.] English summary.

In January 1956, surveys of 2 districts of Takaoka-cho, Kochi Prefecture, Japan, by means of sputum and faeces examinations, showed that 12 of 254 persons (4·7%) were positive for *Paragonimus westermani* eggs. Intradermal tests with an antigen derived from adult worms obtained from experimentally infected dogs showed 31 (12·7%) positive results in 240 persons. Of these 31 persons 15 showed abnormal X-ray findings in the chest.

The antigen was used as 0·05 cc. of a 1 in 10,000 dilution and a positive reaction usually appeared in 10 to 15 minutes.

H. J. O'D. Burke-Gaffney

Arseni, C. & Samitca, D. C. **Cysticercosis of the Brain.** *Brit. Med. J.* 1957, Aug. 31, 494–7, 10 figs.

The author reviews a series of 65 cases of cerebral cysticercosis which were seen by him at the Postgraduate Institute of Medicine, Bucharest, during the years 1935 to 1955. The clinical features and the results of laboratory and radiological examination are described. "Of the 48 patients submitted to operation 11 died at or within a short time of operation, and two more 1 and 2½ years post-operatively respectively. There was no operative mortality with the 12 cases of cortical cysticercosis; but 2 of the 6 ventricular cases, 4 of the 17 basal cases, and 5 of the 13 generalized cases died after operation." *R. M. Gordon*

Abdou, A. H. **Studies on the Efficacy of the Tin Compound Di-n-Butyl-Tin-Dilaurate as a Taeniacidal Agent.** *J. Egyptian Pub. Health Ass.* 1957, v. 32, No. 3, 151–65, 1 fig.

Di-n-butyl tin dilaurate is an oily liquid insoluble in water, but soluble in acetone and alcohol; for experimental use it was diluted with Arachis oil. When given by stomach tube, single doses of 0·02 ml. per 20 gm. killed 3 mice out of 5, but doses of 0·005 ml. were tolerated. The taenicidal activity was tested in mice artificially infected with *Hymenolepis nana*. In a first experiment 5 mice were cleared of the worms by a single oral dose of 0·005 ml. per 20 gm. In a second experiment the same dose cleared 4 out of 5 mice and 1 mouse died. [This death might have been due to the experimental conditions.] In a third experiment, 0·0025 ml. cleared 4 out of 5 mice, 0·00125 ml. cleared 5 out of 5, while in the control groups 2 out of 10 mice cleared themselves spontaneously. In a fourth experiment, 0·0006 ml. cleared 2 out of 5 mice but 0·0003 ml. cleared none out of 5 mice. It is concluded that the minimum effective dose for mice is about 0·00125 ml. per 20 gm. *F. Hawking*

Dungal, N. **Eradication of Hydatid Disease in Iceland.** *New Zealand Med. J.* 1957, June, v. 56, No. 313, 213–22. [13 refs.]

There is little doubt that in the 19th century the population of Iceland was more heavily infected with hydatid disease than populations elsewhere in Europe. Sheep breeding was the main occupation, and most of the people lived in the country in close contact with dogs which had easy access to the entrails of killed sheep. Personal hygiene was of a

low standard, and soap was an article of luxury. In 1847 1 in every 6 Icelanders had hydatid disease.

The origin of hydatid disease in Iceland is obscure, but descriptions of the infection can be recognized in the Icelandic literature from about 1200. The infection was probably brought across in dogs imported from North Germany in the region of Rostock, a district with which the Icelanders traded. Sheep farming was increasing about that time and the then recent acceptance of mediaeval Christian ideology with its neglect of the human body replaced the previous heathen customs and reduced the entire population to a low standard of cleanliness. "The unfortunate combination of a great number of sheep and dogs created a fertile ground for the propagation of hydatid disease in a population with declining hygienic standards."

From 1860 to 1890 Professor Krabbe, an experienced parasitologist, advised the Icelandic Government on prophylactic measures. The human population was then about 70,000 and the canine between 15,000 and 20,000. In 1863 in Iceland, of 100 dogs killed, 28 harboured *Echinococcus granulosus*, while in Copenhagen only 2 out of 500 dogs harboured this parasite. Of the same 100 Icelandic dogs, 75 harboured *Taenia marginata* [*hydatigena*], 18 *T. coenurus* [*Multiceps multiceps*], and 57 *T. cucumerina* [*Dipylidium caninum*]. Sheep were killed on every farm and the spoiled entrails were, by general custom, fed to the dogs. At this time no systematic human autopsy records were kept, but in 1882, 1 out of every 61 people had cysts which caused clinical symptoms. In 1905, 26 out of 86 persons with leprosy were found on autopsy to harbour hydatid cysts. Magnusson (Professor of Surgery) observed in 1912 that he had seen a larger number of old cysts since 1902 than before. He believed that the disease had been regressing markedly and, before his death in 1924, hydatid infection, which had been the most common of diseases, was already rare.

From 1932 systematic human autopsies were performed in Reykjavik. [The statistics are given in detail, and from them it would seem probable that of those persons born in the 1860's and who survived to adult life, one-quarter or one-fifth harboured hydatid cysts. The number of recorded cases and deaths from infection has fallen constantly from the very high rate at the beginning of this century to the last few years when hydatid disease is now seen only in very old people and has disappeared almost completely as a cause of death.] In 1924 a survey of parasites was instituted in sheep. While many were infected with *Cysticercus tenuicollis* the infection rate with *E. granulosus* did not at this time exceed 12%. From 1948 to 1952, 19,000 sheep were examined and, though *C. tenuicollis* was common, no echinococcus cyst was found. No systematic search was made in dogs during this century, until 1950 and 1952, when 66 out of 70 stray country dogs were free from taenia and neither *E. granulosus* nor *T. coenurus* was found.

There was little doubt that *E. granulosus* and most other taenias have

vanished from the dogs, and that cysts in general are becoming rare in sheep, and that echinococcus cysts have almost disappeared. In the human population the disease has disappeared completely except for a few calcified cysts in people born before 1890 and no cysts are now seen in those under 60 years of age. Many factors have influenced this change.

In 1863 Krabbe, in a pamphlet distributed by the Government to every family in the country, described the life-cycle and laid great stress in preventing dogs from eating the entrails of sheep or cattle. A futile tax was imposed on every dog considered unnecessary; but in 1890 a special law imposed a tax on every dog whether considered necessary or not, and forbade the feeding of dogs with the entrails of sheep or cattle and arrangements were made for treating every dog with vermifuge once a year. During the last 40 years slaughterhouses were built all over the country and it was forbidden to kill sheep elsewhere. It is doubtful whether these measures would have led to complete success in the absence of other favourable circumstances. About the turn of the century it was the accepted practice to separate the lambs from the ewes, and to drive the lambs with the grown sheep in spring to the pastures inland while the ewes were kept at the farm for milk. Male lambs were castrated and killed 3 or 4 years later as wethers for mutton. The agricultural practice has changed, for the ewes are no longer milked and wether farming has been abandoned. At present the ewes go with the lambs and sheep to the pasture in spring, eliminating the former close contact between the women and the ewes, and between the ewes and the sheep dog. But probably the most important change is that the male lambs are now killed at the age of 4 or 5 months, so that a potential hydatid cyst which might reach fertility in a wether 2 or more years old, has no opportunity of becoming fertile. This latter change in farming practice may be of greater importance than all the other prophylactic measures. "A combination of circumstances, some purposely enforced and others fortunately associating themselves to the prophylactic measures have resulted in eradicating a dangerous disease which had thoroughly infested the population to such a degree that its existence was endangered." *W. E. Kershaw*

McCarthy, D. D. **The Epidemiology of *Echinococcus granulosus* in New Zealand.** *New Zealand Med. J.* 1957, June, v. 56, No. 313, 206–12.

Though there is a world-wide host range for the adult and for the larval form of *Echinococcus granulosus*, the only definitive host at present known in New Zealand is the dog. Conservative estimates of the number of dogs in New Zealand are about 125,000 in the country and about 45,000 in the town, *i.e.*, 1 dog to every 10 of the population over the whole country and 1 in 5 in rural areas. Town dogs are rarely infected, but

the infection rate in country dogs varies from 10% to 60%, according to locality.

The incidence of hydatid disease in stock appears to vary with the locality and with the age of the animal. Hydatid cysts have been found in 90% of the livers of sheep, 80% of lambs, 60% of cattle and 20% of pigs in freezing works. In Christchurch 12% of lambs were infected at 4 months, and 75% of sheep at 6 years. Little is known of the incidence among deer which are killed in thousands in the hill country, or among the wallabies which are destroyed in great numbers in South Canterbury.

Hydatid disease is probably much more common than hospital statistics or notifications indicate. In 1940, 6,189 consecutive post-mortem examinations disclosed 38 cases (0·61%) and in 1955, 2,558 disclosed 26 cases (1·02%). In Australia the corresponding rate is 2%. [Tables are given of the incidence and distribution of cases and deaths from hydatid disease, from 1891 to 1954, and geographical distribution of new cases from 1948–54.] The incidence of new cases throughout the country districts is fairly uniform, and much higher than in the Auckland and Wellington districts. Most of the cases occur in areas with very high sheep poulations though there are irregularities which suggest that climatic or other factors may play a part in reducing the incidence in certain areas where there are dense sheep populations. The infection is about 5 times as common in rural males and 3 times as common in rural females as in the whole population. The distribution of cases over the life-span supports the view that the majority of infections occur during the age of childhood through the agency of " dirty fingers ".

Control measures have been attempted but " Our lack of success illustrates well the fact that measures of control which are successful in one area will not necessarily be successful in another and that detailed knowledge of the relationship of the parasite to its local environment and the other inhabitants of that environment is essential before successful control measures can be assured. New Zealand cannot house its 32 million sheep for six months and thereby attain absolute segregation of sheep and dogs and ensure that no pasture contamination occurs for the same period.

" We know that the dog obtains his infection from the ingestion of fresh infected offal, but we do not know for certain the place or places at which the sheep becomes infected. Are the pastures highly contaminated throughout or is infection in sheep mainly associated with mustering, shearing, dipping, etc., when sheep are concentrated in mobs in close contact with dogs in the restricted and probably heavily contaminated environment of the sheep yards ? We know that areas of high, medium and low endemicity exist within our borders, and that some farms with a high animal incidence march with others with a relatively low incidence. Other than the general one of varying concentrations of sheep and dogs we know little of the reasons for these variations. . . .

" The determination of these factors can only come from specific

research into all possible means and methods of spread. Iceland through her own peculiar and particular local conditions has succeeded in effecting satisfactory control. Australia is in the process of investigating her hydatid problem in relation to her varied local conditions. New Zealand must do the same and the already considerable annual economic loss to the country's meat industry urges that action should not be delayed."

W. E. Kershaw

Gibbs, H. C. **On the Role of Rodents in the Epidemiology of Hydatid Disease in the Mackenzie River Basin.** *Canadian J. Comp. Med.* 1957, Aug., v. 21, No. 8, 287–9.

"Attempts at infecting rodents of the following species, *Clethrionomys gapperi*, *Microtus pennsylvanicus* and *Peromyscus leucopus*, with gravid segments of the cestode *E. granulosus* obtained from the Mackenzie River basin area proved unsuccessful.

"Field checks done on equal numbers of rodents of the above species to determine the incidence, if any, of natural hydatid infection showed no evidence of infection."

Canabal, E. J., Dighiero, J., Aguirre, C. V., Baldomir, J. M., Purcallas, J., Suzacq, C. V., Horjales, J. O., Hazán, J. & Scremini Algorta, P. Nuestra experiencia en el tema de la equinococosis cardíaca. [**Personal Experience in the Field of Heart Echinococcosis**] *An. Facul. de Med. Montevideo.* 1957, Jan.–Feb., v. 42, Nos. 1/2, 33–9. [26 refs.]

The English summary appended to the paper is as follows:—

"The authors report their experience on echinococcus disease of the heart based on the observation of sixteen cases, placing special emphasis on facts and methods leading to the early diagnosis of the condition."

Izzo, G. L'incidenza dell'anchilostomiasi nel Comune di Napoli negli ultimi venti anni. [**The Incidence of Ankylostomiasis in the Naples Municipal Area in the last 20 Years**] *Acta Med. Italica.* 1957, June, v. 12, No. 6, 157–65. [49 refs.]

This paper gives a full account of the disease in general, and the incidence in the city area forms only a small portion of the whole article. The period mentioned extends from 1935 to 1955 and the figures of cases ascertained are given for each year. They reached double figures for the years 1935–1940 (maximum 36 in 1936), 5 were ascertained in 1941, and thereafter only 1 case was found in any subsequent year and none at all in 9 different years.

Almost the sole focus of infection was in the Ponticelli area which is on the boundary, on the way to Vesuvius. It was then a rural area almost completely given over to horticulture. The water supplies and sanitary accommodation, including arrangements for disposal of faeces, were grossly deficient or non-existent, and the soil and climate such that ankylostome larvae could flourish. All the persons found infected were agricultural workers between 14 and 30 years of age. The usual preventive measures were begun (including the disinfection of cesspools, manure and ground by a mixture of ferrous ammonium sulphate and calcium cyanamide which in addition to its disinfecting power has important properties as a fertilizer), but the measure which has been most effective has been the almost complete urbanization of the area in recent years: it is now a popular residential area with full hygienic amenities.

W. K. Dunscombe

Henderson, H. E. **Incidence and Intensity of Hookworm Infestation in certain East Texas Counties with Comparison of Technics.** *Texas Reports on Biol. & Med.* 1957, v. 15, No. 2, 283–91. [15 refs.]

The author refers to 3 earlier papers on hookworm infection in Texas [this *Bulletin*, 1937, v. 34, 453; 1946, v. 43, 465] and records the results of his own study of it during the years 1948–53.

Stools were collected in metal boxes and examined by the zinc sulphate flotation method and by direct smears. Positive specimens were also examined by a modification of the small-drop dilution egg-counting method of Stoll and Hausheer [*ibid.*, 1926, v. 23, 776].

The incidence in 11 East Texas counties was 33·4% of 8,308 specimens examined. The Rockefeller Sanitary Commission in 1912–14, using the direct smear only, recorded an incidence of 37·4% in 32,151 children aged 6–18 years. Because the present author found only 57·8% of his positives by the direct smear, he suggests that the real incidence in 1912–14 was nearly 100%; he discusses the factors which influence the interpretation of surveys of the incidence and the relationship of the estimated incidence to the severity of hookworm disease and its treatment. The range of the incidence found by the present author varied from 51·3% in Tyler County to 19·2% in Polk County and there was a negligible incidence of 1·7% in 406 coloured people.

Comparison of the efficiency of the techniques used on 1,227 specimens showed that 97·6% of the positives were found by the zinc flotation method and 57·8% by the direct smear. Although the Stoll and Hausheer method was not used on specimens found negative by other techniques, it revealed eggs in 91·8% of those found positive. Discussing this, the author concludes that the direct smear is of little value for the detection of hookworm infection, but is useful for detecting patients requiring treatment; it is the quickest and cheapest method for this purpose, although it would entail unnecessary treatment of 35–45% of

light or very light infections. For the detection and identification of other intestinal parasites the author recommends some type of zinc sulphate concentration, followed by the examination of all hookworm positives by the Stoll and Hausheer method. *G. Lapage*

Noel, A. Contribution à l'étude de la thérapeutique de l'ankylostomiase. [**Contribution to the Study of the Therapy of Ankylostomiasis**] *Arch. Belges Méd. Sociale, Hyg., Méd. du Travail et Méd. Légale.* 1957. Feb., v. 15, No. 2, 104–7.

The author treated ankylostomiasis in the Belgian Congo with carbon tetrachloride, thymol, tetrachlorethylene hexylresorcinol and oil of chenopodium or chloroform, but required a quicker and better method of treatment. He reasoned that because the worms (*Ancylostoma duodenale* and *Necator americanus*) are in the duodenum, it is logical to use a duodenal sound, which avoids the actions of anthelmintics on other organs and also gastric trouble caused, for example, by thymol; it also ensures prolonged action of the drug on these small worms, whereas oral administration permits only a quite temporary action. The author preferred instillation of the drugs used drop by drop during 2 hours. The apparatus required is simple and gives a minimum of trouble to both patient and doctor. German authors [references not given] have proposed a similar technique for the treatment of *Taenia* infections with 400–800 mgm. of mepacrine, which gave excellent results. The author tried mepacrine for ankylostomiasis, but there were 7 failures out of 17 patients treated. The present method ensures strong action of the drug with a minimum of risk. The formula used was 200 mgm. thymol per year of age (maximum 3 gm.) in 1% solution at 37° (this gives a more prolonged action than the 2% solution originally tried, the volume being twice as much); Epsom salts, 10 gm. per 1 gm. thymol; oil of chenopodium, 1 drop per year of age (maximum 25 drops); castor oil, 10 cc. per 1 gm. of thymol. These were maximum doses.

The patient, fasting, lay on the right side with the head slightly raised and delivery of the remedy was adjusted to last about 2 hours. After some hours of observation, the patient was allowed to go home, but was told to fast till the following day. No "accidents" were noted. The urines of the patients remained clear. For some patients not in good condition rather smaller doses were given and these patients should be kept in hospital for some days. Markedly enfeebled patients were given hexylresorcinol instead of this treatment.

Results of the treatment were checked by direct examination of the stools and by salt flotations on the 10th, 15th and 20th day. Of 50 patients 35 (70%) were completely cured; in 8 a few eggs appeared in salt flotations and 7 were complete failures. The 15 patients not cured were given the treatment again 8 days later and 3 of these 15 were then

not cured. Most of the patients had other "intestinal parasites". *Ascaris* was always totally eliminated by the treatment. Some of the failures seemed to be due to protection of the small worms by a coating of food material and the author therefore tried washing the worms before the drug was given by instillation of 250 cc. of "bicarbonated water at 5%"; the results were then better. Of the 50 patients thus treated, 42 (84%) were cured, a few eggs appeared in salt flotations of 4, and 4 were complete failures. *G. Lapage*

Schacher, J. F. & Danaraj, T. J. **Creeping Eruption, a Non-Patent, Zoonotic Helminthiasis in Singapore.** *Proc. Alumni Ass. Malaya.* 1957, June, v. 10, No. 2, 141–6, 4 figs. [21 refs.]

The patient was an American female who presented all the classical signs and symptoms of creeping eruption. The causal parasite was not recovered but dogs and cats in the area were found to be infested with *Ancylostoma braziliense* and *A. ceylanicum* and the authors presume that a larva of one of these species was responsible. Treatment with diethylcarbamazine at a dosage of 2 mgm. per kgm. body weight for 4 weeks (100 mgm. thrice daily) relieved the symptoms and slowed down the migrations of the larva but, apparently, failed to kill it. The paper contains an excellent review of the literature. *R. M. Gordon*

Deschiens, R. & Bénex, Jacqueline. Essais expérimentaux et cliniques de traitement de l'anguillulose intestinale par le sous-nitrate et par le carbonate de bismuth. [**Clinical and Experimental Trials of the Treatment of Strongyloidiasis with Bismuth Subnitrate and Bismuth Carbonate**] *Bull. Soc. Path. Exot.* 1957, Jan.–Feb., v. 50, No. 1, 70–74.

The authors first tested the action of bismuth subnitrate and carbonate and that of stannous oxide on faecal cultures of the rhabditoid and strongyloid larvae and the adults of *Strongyloides stercoralis* of man and *S. fülleborni* of the chimpanzee. The cultures were made with the faeces of man and the chimpanzee infected with these two species of nematodes, mixed with rabbit faeces [see Lamy and Benex, this *Bulletin*, 1956, v. 53, 1181]. Each culture contained 1 part of either stannous oxide, or bismuth subnitrate or bismuth carbonate to 3 parts of faeces. In cultures of both *S. stercoralis* and *S. fülleborni* containing bismuth subnitrate no development of the worms occurred and dead rhabditoid larvae were found on the third day. Cultures containing bismuth carbonate were also abortive, but a few strongyloid larvae were found in them on the fifth day. Stannous oxide inhibited the cultures, but did not sterilize them. Stannous oxide favoured the development of saprophytic fungi. The

authors concluded from these *in vitro* experiments that bismuth subnitrate has an anthelmintic action on both species of worms and that bismuth carbonate has a similar but feebler action.

For the clinical tests only 5 patients were treated, but, as these were cured, the authors think that the results should be recorded. All 5 patients were Europeans. The faeces of all 5 contained embryonated eggs or rhabditoid larvae of *S. stercoralis* and all the patients had symptoms of the infection. Treatment was as follows:

1st–8th day: 15–20 g. [presumably grammes; but the British Pharmacopoeia dose of bismuth subnitrate is 5 to 20 grains (0·3 to 1·2 gm.) and warnings have been given to use it with caution because of bismuth poisoning. A dose of 15 to 20 gm. seems extraordinarily high] of bismuth subnitrate were taken in 100 cc. of milk daily by mouth at the end of breakfast.

9th–15th day: 2 g. of stannous oxide were taken at breakfast, 2 g. at lunch and 2 g. at supper.

16th–23rd day: the bismuth subnitrate was repeated.

23rd–30th day: the stannous oxide was repeated.

This treatment was kept up for 2–3 months. The stannous oxide has only a limited action on the worms, but it was given to modify the intestinal enviroment. Bismuth subnitrate was non-toxic and was well tolerated.

The authors examined the stools for periods of 8 successive days and at the end of each month and also 3 months after the end of treatment they examined stools obtained by administration of magnesium sulphate.

They concluded that the patients were clinically cured. *G. Lapage*

Fan, P. C. & Hsu, J. **Filariasis in Free China. Part III. Incidence in Penghu Chinese.** Reprinted from *Chinese Med. J.* Taipei. 1957, Mar., v. 4, No. 1, 35–48, 1 map.

This paper reports the result of filariasis surveys in 13 villages of the 3 main islands of the Penghu archipelago lying between Taiwan and the Chinese mainland. Blood films were made around midnight from 1,774 of the 15,189 inhabitants of the villages, and 227 (12·79%) were found to be carrying microfilariae of *Wuchereria bancrofti*. This infection rate is much higher than the incidence of 1·5% already reported for Taiwan Chinese [this *Bulletin*, 1957, v. 54, 66] but lower than the rate of 19·1% reported for Kinmen. It has risen as compared with a previous survey in Penghu in 1939 when the incidence was 7·84%.

The spread of infection is believed to be due to the economic depression and lowering of sanitary standards during World War II, which permitted

extensive breeding of insect vectors, and to other factors tending to localize the vectors in houses and so facilitate transmission. The infection rates for the 3 islands were similar but considerable differences existed between villages, probably depending on the amount of vector breeding. There was a higher incidence in females than males (15·8% as compared with 12·5%) in almost every village, probably because the men were mainly fishermen and occupationally less exposed to the vectors. This view was supported by the age distribution of filariasis, the incidence being higher in males than females in the groups 5 to 10 and 41 to 60, and lower during their prime when they were likely to be at sea. The infection rate rose steadily from 9·18% in the 5 to 10 age-group to 20·74% in the 31 to 40 age-group, sank to 14·21% in the next decade and then rose again to 22·39%, after which the incidence declined to 14·97%. The majority of cases were lightly infected and only 5% were heavily parasitized. *T. H. Davey*

South Pacific Commission. Nouméa, New Caledonia. **Developmental Stages of Filariae in Mosquitoes** [Iyengar, M. O. T.]. *Technical Paper No. 104.* 1957, May, iii + 11 mimeographed pp., 27 figs. on 11 pls. & 1 map. [15 refs.]

A brief description is given in this paper of the comparative morphology of the microfilariae of *Wuchereria bancrofti*, *W. malayi* and *Dirofilaria immitis*, and of their development in the appropriate mosquito vectors. In addition, the paper contains a useful account of the structures which are likely to be encountered during the course of mosquito dissections and which might be mistaken for filaria larvae.

The paper is fully illustrated with numerous photomicrographs and figures. *R. M. Gordon*

Rachou, R. G., Villela, A. M., Cruz, A. E. & de Carvalho, G. A filariose bancroftiana em Recife (Pernambuco): resultado de um inquérito realizado em 1954–1955. [**Survey of *Wuchereria bancrofti* Filariasis in Recife, Pernambuco, in 1954–1955**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1956, Apr., v. 8, No. 2, 359–67. English summary.

In 1952, de Azevedo & Dobbin [this *Bulletin*, 1954, v. 51, 81] made a filariasis survey of a residential district of Recife, the capital of Pernambuco, Brazil, and found an incidence of 9·7%. The present authors have extended the survey to all the 13 districts of the city, by means of blood examinations of a representative sample of the population and indoor capture and dissection of mosquitoes. All samples were taken at night.

It was hoped to examine the blood of 5% of the population, but owing

to some lack of cooperation on the part of the people, only 4·5% (23,065) persons were examined. The results are shown in 6 tables, some of them giving details by age, race, the time of taking of the samples and for each of the 13 districts separately. The entomological results are also shown in terms of the larval stages of *W. bancrofti* found in mosquitoes.

Of the 23,065 persons living in 6,048 houses, 1,589 (6·9%) showed microfilariae of *W. bancrofti* in the blood. The rate varied from 5·6% at 7 p.m. to 10·9% at 11 p.m. The microfilariae rate varied from 0·8% to 13·1% in the different sections of the city. No child under 1 year was positive and only 1·2% of those between 1 and 4 years were positive. The average number of microfilariae per positive person was 14·9. The highest number of microfilariae found in 20 cmm. of blood was 365. Infected persons were found in 19·2% of the houses visited.

The same houses were searched for mosquitoes of which 23,881 were captured: all but 7 were *Culex fatigans*. 82% of the houses contained *Culex fatigans*, the average number per house being 3·9. Of 14,158 *C. fatigans* mosquitoes examined for filarial larvae, 7·3% were positive and 1% harboured infective larvae. The highest number of parasites found in a single mosquito was 337. *H. J. O'D. Burke-Gaffney*

Khramelashvil, N. G. [*Dirofilaria repens* **under the Conjunctiva of the Eye**] *Med. Parasit. & Parasitic. Dis.* Moscow. 1957, v. 26, No. 4, 481–2, 1 fig. [In Russian.] English summary (8 lines).

Osnes, M. Loiasis. Noen tilfelle behandlet med diethylcarbamazine. [**Loiasis. Some Cases treated with Diethylcarbamazine**] *Nordisk Med.* 1957, Sept. 5, v. 58, No. 36, 1317–19, 3 figs.

The English summary appended to the paper is as follows:—

"Six patients had lived for some time in an hyperendemic area in the French Cameroons. They developed the ordinary symptoms of loiasis. Two patients suffered also from lymphoedema, which disappeared after treatment with hetrazan. The diagnosis was verified in 3 cases by finding typical microfilariae of loiasis in thick blood films. In 2 other cases the disease had been diagnosed in Africa. In the fifth case biopsy of a subcutaneous nodule showed filariae. All cases had typical symptoms and signs of this disease. In 3 cases the treatment was successful after one course of treatment. The other 3 cases had a further course of treatment."

See also p. 1467, Rodger, **Acute Ocular Onchocerciasis and its Treatment.**

Jaswant Singh & Raghavan, N. G. S. **Dracontiasis in India. Its Public Health Importance and Control.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1957, May, v. 5, No. 3, 141–60. [Numerous refs.]

This interesting paper deals fairly comprehensively with the different aspects of dracontiasis in India and reviews fully the literature from that country. It is noted that the disease is endemic among the 5 million people living in the States of Rajasthan, Bombay, Andhra, Madras, Madhya Pradesh, Madhya Bharat, Mysore and East Punjab. Accounts are given of the epidemiology, the parasite and its life cycle, and it is noted that 6 species of *Cyclops* belonging to 3 genera act as vectors in India. Dracontiasis is a more serious public health problem than is commonly recognized; temporary or permanent incapacity results, interfering with agriculture and causing considerable economic loss.

In the section on treatment, oral administration of minced adventitious roots of the banyan tree in sugar is recommended as an agent facilitating the removal of the mature worms. Under control, the measures recommended include prevention of human access to water surfaces, and the elimination of cyclops from water supplies by screening, boiling or by biological or chemical agents. Laboratory studies in India have shown the efficacy of DDT wettable powder at 5 parts per million against cyclops and water-point treatment has proved successful in Africa [this *Bulletin*, 1956, v. 53, 353]. It is also recommended, following Rousset's experience in Africa [*ibid.*, 1954, v. 51, 202], that prophylactic treatment with diethylcarbamazine should be investigated during the latent period about 6 months after probable infection. *T. H. Davey*

Cochrane, J. C., Sagorin, L. & Wilcocks, M. G. *Capillaria hepatica* **Infection in Man. A Syndrome of Extreme Eosinophilia, Hepatomegaly and Hyperglobulinaemia.** *South African Med. J.* 1957, July 27, v. 31, No. 30, 751–5, 4 figs. [20 refs.]

The authors give a detailed zoological description of *Capillaria hepatica*, comparing it with its relative the whipworm, *Trichuris trichiura*. Its hosts are various rodents and dogs and cats, and rarely man. Its life history is described and the authors refer to the literature on the 4 other cases of human infection with it [this *Bulletin*, 1924, v. 21, 963; 1951, v. 48, 183; 1955, v. 52, 1129; 1956, v. 53, 784]. 3 of these subjects were children and one was a British soldier in India; all of them died. The case described by the authors, a European child born of Afrikaner parents, is the first recorded in South Africa and the third to be diagnosed during life; this child was successfully treated and is alive and well.

The adult worms move to the liver and lay their eggs there. Opinion is divided as to whether these eggs can infect a host that eats the infected liver or whether the eggs must first be passed out of the host to become

infective in the soil. The child treated by the authors was an earth-eater, as were the other children infected, and human infection seems to be always acquired from eggs in the soil. Rats and mice were present in the environment of the child here described and the only rat the authors could trap was extensively infected with *Capillaria hepatica*. Photographs of its liver are shown. The child was almost certainly infected by eating the infected local soil.

The patient's symptoms are described in detail. They include fever, and an absolute eosinophilia of 14,000 per cmm. Investigation of other possible causes of this eosinophilia ruled them out, but several tests for liver function were all maximally positive and gamma globulin was 5 gm.%. A secondary anaemia, with 8·6 gm.% haemoglobin, was present, with a leucocyte count usually about 25,000 per cmm. and an eosinophil count over 5 months ranging from 25 to 78%, with absolute totals of 6,630 to 32,526 per cmm.

Laparotomy revealed a moderately enlarged liver studded with yellowish-grey, pinhead nodules or larger aggregations of these 2–3 cm. in diameter. There were no signs of early cirrhosis; the spleen was not enlarged. Biopsy of the liver revealed, in sections, of which 3 photographs are given, large numbers of *Capillaria* eggs. The diagnostic features of these are given. The eggs were surrounded by a dense cellular infiltrate, consisting of a large number of eosinophils, plasma cells, lymphocytes and histiocytes, replaced, in some areas, by fibrosis. The liver pattern was distorted round the eggs and some liver cells were destroyed, but there was no regeneration of liver cells. This pathological picture resembled that of the other cases described.

The patient was given oxytetracycline, tetracycline and penicillin, but these failed to reduce the pyrexia. To reduce the fibrosis Meticorten [prednisone], 5 mgm. daily, was given, with Methischol "as a liver supportive measure". These drugs seemed to cause considerable improvement, which continued for 2 months. Specific treatment for the worm was then begun. Because chloroquine, emetine and diethylcarbamazine had failed in earlier cases, the authors gave antimony (Triostam) intravenously to a total of 380 mgm. in 7 injections. No further pyrexia occurred and the liver decreased in size to one fingerbreadth below the costal margin. Eosinophilia was, however, still in the region of 30%. When the paper was written the child was well and was being kept under observation.

Discussing the diagnosis, the authors say that the most important sign of the infection is the eosinophilia and they think that chronic eosinophilia described in various forms (the father and one brother of this patient had unexplained eosinophil counts of 8 and 10%), may be different descriptions of parasitic liver infection. The broad syndrome common to these conditions is enlargement of the liver, marked chronic eosinophilia, eosinophilic granulomatous liver lesions, pyrexia, leucocytosis and hypergammaglobulinaemia, with or without pulmonary X-ray changes. The

syndrome has been chiefly associated with infection of the liver by the larvae of *Ascaris lumbricoides* and those of its relatives, *Toxocara canis* of the dog and *T. mystax* of the cat [this *Bulletin*, 1956, v. 53, 1457, 1458]. Infection with *Capillaria hepatica* is, however, much more severe than these and the intense fibrosis of the liver and the intractable cirrhosis make the outlook extremely serious. *G. Lapage*

Duran-Jorda, F. **Appendicitis and Enterobiasis in Children. A Histological Study of 691 Appendices.** *Arch. Dis. in Childhood.* 1957, June, v. 32, No. 163, 208–15, 16 figs.

During a histological study of surgically removed appendices fixed by formalin vapour, *Enterobius vermicularis* was encountered so frequently that a special study of this parasitosis was undertaken, at a children's hospital in Manchester.

Enterobius was found in the appendices of 19 of 400 boys (4·7%) and of 33 of 291 girls (11·3%). Appendicitis was more frequent in boys than in girls (1·3 to 1), but enterobiasis was nearly 2½ times as frequent in girls as in boys. In a further study of 300 children by the Scotch tape method, enterobiasis was diagnosed in 81 children, in 40 of 164 boys (24%) and in 41 of 136 girls (30%), with a total incidence of 27%. In the appendicectomy group no *Enterobius* was found in the 0–5 year age-group and the highest incidence was seen in girls of the 5–11 group (16%). Among the others, the same age-group showed most cases, but the preponderance was not so striking.

Examination under the dissecting microscope and histological study showed that most of the larval forms were buried deeply in the tissues, and that nearly all forms were at least covered by the superficial cellular layer of the mucosa. Thus, they were shown to be in the semisquamous layer, in the superficial layer of the mucous membrane proper, in the glandular layer, in lymph nodules, or in the subperitoneal layer. The larvae burrow deeply into the tissues and there become adults; these return to the surface and lie in the superficial layer where their wriggling movements frequently disturb the surface before they eventually return to the lumen of the bowel to continue their journey down the intestinal canal. "Thus, it appears the appendix suffers mechanical damage on two occasions; when the larva leaves the ovum and burrows into the appendicular semisquamous epithelial layer in search of a place to develop into adult stage in comfort, and again when the individual parasite has reached full maturation, freeing itself and emigrating, full of ova, to the anus." There is danger of infection of the appendicular tissues on each occasion. *L. E. Napier*

DEFICIENCY DISEASES

Lal, S. B. & Roychowdhury, S. P. **Total and Available Iron Content of some Foodstuffs of Bihar.** *J. Indian Med. Ass.* 1957, Aug. 16, v. 29, No. 4, 139–44.

Nurge, Ethel. **Infant Feeding in the Village of Guinhangdan, Leyte, Philippines.** *J. Trop. Pediatrics.* London. 1957, Sept., v. 3, No. 2, 89–96.

Oomen, H. A. P. C. **Assessment and Prevention of Child Malnutrition.** *Papua & New Guinea Med. J.* Port Moresby. 1956, May, v. 2, No. 1, 1–20, 3 graphs.

This is an admirably succinct account of the clinical methods at present available for the assessment of nutritional status in the tropics. Methods of prevention, especially the educational aspects, are fully discussed. The author writes with much experience and the conclusions are valid over a much wider geographical range than Papua and New Guinea. Indeed it can be strongly recommended to any young doctor going to the tropics for the first time. *R. Passmore*

Jelliffe, D. B. **Social Culture and Nutrition. Cultural Blocks and Protein Malnutrition in Early Childhood in Rural West Bengal.** *Pediatrics.* Springfield, Ill. 1957, July, v. 20, No. 1, Pt. 1, 128–38, 3 figs.

"Examples of malnutrition related to protein deficiency, including kwashiorkor, nutritional marasmus and 'nutritional growth failure,' are commonly seen in early childhood in rural West Bengal. While this was mainly due to poverty, and especially the economic inability to buy animal protein foods, together with repeated attacks of enteritis and constant intestinal parasitism, in addition, it was found that certain aspects of the local domestic culture pattern acted as 'cultural blocks' between the child and the theoretically available sources of protein. Results of a survey of local methods of infant feeding are summarized and some of the important cultural blocks outlined, including delays in the traditional rice-feeding ceremony, reasons for unwillingness to introduce mixed feedings in the second 6 months of life, failure to use or produce certain foods (with especial relation to the four types of food classification found in the village), general dietary restriction during illness and specific blocks with regard to individual sources of protein. The importance of having health measures based on an understanding of the local domestic culture pattern is emphasized."

[The author apologizes for this article "in the absence of assistance from a trained socio-anthropologist". It is probable nevertheless that

because of his obvious knowledge and skill with children he inspired more confidence and was given more accurate information in a short time than could possibly have been available to or analysed by an anthropologist. This article is one of the few attempts to identify the complex of causes as well as the varieties of malnutrition. The contribution of each factor to the development of malnutrition will vary from case to case. This type of investigation should be widely followed.] *Cicely D. Williams*

Bohidar, R. C. **Nutritional Disorders in Children.** *Pakistan Med. J.* 1957, July, v. 8, No. 7, 5–14.

The article opens with some basic information about nutrition, and is careful to distinguish between primary and secondary malnutrition. This is followed by the report of a survey of 344 schoolchildren aged 5–10 years from the Bargarh Community Project area. The great majority were children of labourers and cultivators, and were boys. Of these children nearly 50% showed signs of deficiency condition, and over 50% showed signs of some chronic, coexisting disease. Apparently no child had more than one of these diseases [which is surprising] of which upper respiratory infection is the most common.

The next section gives an account of 4,000 children examined at Bargarh Hospital in 2 years. Of these, 1,268 showed signs of malnutrition and 1,068 of them had other diseases as well—mainly gastro-intestinal. The author states that the commonest diseases are anaemias, hypoproteinaemia, avitaminosis A, B complex and D, in this order, and many patients suffer from multiple deficiences.

There is a section on "preventive" measures, with recommendations as to diet, and a table showing approximate daily requirements of food factors.

The author regrets that in spite of various schemes and programmes undertaken by both central and local governments at enormous cost, malnutrition in children still remains a major problem. [And so it will, until it is realized that lack of food is not the only or even the main cause of malnutrition. The author has been to considerable trouble to collect his figures, but mere identification of varieties of malnutrition is not enough. He should be recommended to read the article by Professor D. B. Jelliffe, see above.] *Cicely D. Williams*

Lassance, M., Peeters, E. & Grailet, A. Note sur l'existence d'une avitaminose C endémique dans la région de Gety. [**A Note on the Existence of Endemic Avitaminosis C in the Region of Gety, Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1957, Apr. 30, v. 37, No. 2, 269–78.

At the end of the dry season the supply of fruit and vegetables in Gety, Belgian Congo, is extremely limited. Gingivitis is a common

clinical finding. In 25 patients with gingivitis the content of vitamin C in the urine was very low and only a very small proportion of a test dose of 500 mgm. of the vitamin was excreted in the urine. *R. Passmore*

Payet, M. Considérations étiologiques et histologiques sur les principales formes de cirrhoses non alcooliques observées en Afrique Noire. [**Aetiological and Histological Considerations on the Principal Forms of Non-Alcoholic Cirrhosis of the Liver observed in French Africa**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1957, Nos. 20/21, 602–8.

The author writes with experience of 500 patients with cirrhosis of the liver seen in Dakar. Alcohol was not an important factor and accounted for only 2%. It is maintained that true nutritional cirrhosis is very rare and, in this region at least, references to undernutrition and to unbalanced diets appear more sentimental than objective. The majority of cirrhoses attributed to nutritional factors are in reality the result of an antecedent infectious hepatitis. The role of kwashiorkor in producing cirrhosis is very uncertain. *R. Passmore*

Gómez, F.; Ramos-Galván, R.; Cravioto, J.; Frenk, S.; Janeway, C. A.; Gamble, J. L.; Metcoff, J.; Antonowicz, Irena. **Intracellular Composition and Homeostatic Mechanisms in Severe Chronic Infantile Malnutrition. I. General Considerations** [Gómez, Ramos-Galván, Cravioto, Frenk, Janeway, Gamele & Metcoff]. *Pediatrics.* Springfield, Ill. 1957, July, v. 20, No. 1, Pt. 1, 101–4, 2 figs. [18 refs.] **II. Composition of Tissues** [Frenk, Metcoff, Gómez, Ramos-Galván, Cravioto & Antonowicz]. *Ibid.*, 105–20, 2 figs [32 refs.]

The distinguished pioneer in research on electrolytes in children's diseases, Professor J. L. Gamble of the Children's Medical Center, Boston, is associated with a group of workers from Mexico City and Harvard Medical School in determining the electrolytes and the regulation of their concentration in severe chronic malnutrition of infants. The worse the malnutrition, the less the child is able to retain the homeostatic mechanisms which determine the correct level for the intra- and extracellular electrolytes.

22 such infants were examined at the Hospital Infantil, Mexico. Every child had undergone a severe and prolonged limitation of food intake and the sources of protein were chiefly vegetables. One-third of the children were oedematous and 4 showed extreme wasting. The intracellular ions were determined from samples of muscle and skin which were taken by biopsy at the time of admission to the ward, before any treatment had commenced and later at different periods during

clinical recovery or regression. The electrolyte composition of the extracellular fluid was calculated from the measured concentrations in the serum water. In most cases, muscle and skin showed an increase in extracellular fluid—water, sodium and chloride. This was even found, though the change was less pronounced, when "dehydration" was considered to be present on clinical grounds. Potassium (the intracellular ion) was slightly decreased in the muscle samples, particularly when the children were oedematous. The skins showed a water content which went parallel with the clinical assessment of the oedema.

H. Lehmann

Van Oye, E. & Charles, P. Contribution à l'étude de la nutrition en Afrique Centrale: comparaison entre les taux des protéines sériques établis en 1951 et an 1956 chez les Noirs de Léopoldville. [**A Contribution to the Study of Nutrition in Central Africa: a Comparison of the Values of Serum Proteins established in 1951 and in 1956 among Africans in Leopoldville**] *Ann. Soc. Belge de Méd. Trop.* 1956, Oct. 31, v. 36, No. 5 *bis*, 793–800. [11 refs.]

Serum protein estimations were made on 100 men, 100 women and 100 pregnant women from the African population in Leopoldville and the results compared with a similar survey in 1951. A pronounced increase in the levels of total protein was found. This could be ascribed almost entirely to a rise in serum albumin, as globulin levels were little changed. It is concluded that these changes are important and significant; they reflect an amelioration of the conditions of life in general and of the state of nutrition in particular among the Africans. The authors state that this is concrete evidence of the efficacy of social action pursued among them.

R. Passmore

Patel, B. D., Gaitonde, B. B., Jadhav, M. A. & Rao, G. S. **Paper Electrophoresis of Serum Proteins in Malnutrition.** *Indian J. Child Health.* 1957, June, v. 6, No. 6, 289–98, 3 pls.

The following table summarizes the biochemical findings. All figures are in gm./100 ml. of serum and are averages.

Type of case	*No. of cases*	*Total Protein*	*Albumin*	*Globulin*			
				Alpha 1	*Alpha 2*	*Beta*	*Gamma*
Normal	10	6·3	3·4	0·31	0·59	0·74	1·21
Marasmic malnutrition	17	5·0	2·3	0·31	0·60	0·60	1·15
Malnutrition with oedema	30	4·3	1·6	0·30	0·54	0·53	1·23

In a small group (13 children) with severe oedema the mean level of gamma globulin was 1·38.

R. Passmore

Gómez, F., Ramos-Galván, R., Cravioto, J., Frenk, S., de la Peña, Carmen, Moreno, María E. & Villa, María E. **Protein Metabolism in Chronic Severe Malnutrition (Kwashiorkor). Absorption and Retention of Nitrogen from a Typical Poor Mexican Diet.** *Brit. J Nutrition.* 1957, v. 11, No. 3, 229–33, 2 figs. [16 refs.]

"1. Nitrogen-balance experiments were made on eight children aged from 1 to 5 years affected with chronic severe malnutrition. During the experiment they were kept on a diet of corn (maize) meal and beans.

"2. Both nitrogen absorption and nitrogen retention were extremely variable from one child to another. Four children were in positive nitrogen balance and four in negative. No correlation could be found between the caloric intake and the nature of the balance.

"3. The fact that some children retained nitrogen from a diet as poor as this may help to explain why some develop severe malnutrition and others remain reasonably healthy even when all have almost the same dietary habits."

Senecal, J., Pille, G., Vuylsteke, J., Dupin, H. & Aubry, L. Résultats fournis par l'amylasémie dans les états de malnutrition. [**The Amylase Content of the Blood in States of Malnutrition**] *Bull. Méd. de l'Afrique Occidentale Française.* (n.s.) 1957, v. 2, No. 1, 140–44.

Healthy African children have between 60 and 90 units (Somogyi) of amylase in their blood. In children with severe kwashiorkor the level is lowered and may fall to 10 units. These very low levels are associated with a poor prognosis. There is a rapid rise during treatment and after 7 days the value may be much higher than normal and thereafter fall slowly to reach normal levels. In 14 patients with very mild kwashiorkor, amylase levels were sometimes normal and the decrease, if present, slight. In undernourished very thin children the initial amylase levels are very variable, but when weight increases on feeding there is usually a corresponding rise in the serum amylase. *R. Passmore*

Sarin, B. P. **Clinical Observations on "Kwashiorkor" or Protein Undernutrition in Rangoon.** *Indian J. Child Health.* 1957, June, v. 6, No. 6, 300–307. [17 refs.]

Kwashiorkor has been known in Burma for a long time under the name *Noc myet*, meaning the condition the child gets when the mother becomes pregnant. In Rangoon in 1956, 32 cases were seen at various children's clinics. The signs and symptoms of the disease are fully described; in general the disease appears to present clinical features in Rangoon similar to those in other parts of the world. Among the poorer section of the population the children are breast fed. After weaning the only milk given is condensed milk, which is rich in carbohydrate but poor in

proteins. It is comparatively cheaper than fresh cow or buffalo milk and more easily procurable. *R. Passmore*

Raoult, A., Thomas, J., Thiery, G., Perrin, G. & Perrellon, G. Les parotidoses de malnutrition en A.O.F. [**The Parotidoses of Malnutrition in French West Africa**] *Bull. Méd. de l'Afrique Occidentale Française.* (n.s.) 1957, v. 2, No. 1, 5–72, 4 graphs & 14 figs. [Numerous refs.]

The authors have made a very thorough study over many years of parotid swellings in children and their conclusions are summarized in this long paper, which is indeed a full monograph on the subject and a valuable contribution to nutritional literature.

Parotid swelling among the children is common in parts of French Africa and in some villages as many as 28% of the children may be affected. It can be attributed to nutritional deficiencies, probably lack of protein. Field studies showed that in different villages the incidence was correlated with the intake of dietary protein. It was much commoner in the inland villages where little or no animal protein is available and rare in the coastal villages where fish is a regular feature of the diet. Parotid swelling may be the only sign of malnutrition in a child, but it is frequently found in association with other signs especially oedema and enlargement of the liver. If the parotid glands were greatly enlarged (+ + +), the liver also was found to be almost always enlarged. The swellings subsided after 1 to 2 months in 90% of the children if dried milk were given. A regular supplement of milk also prevented the condition appearing.

The age distribution is, however, different from other forms of protein malnutrition. The incidence was negligible in children below 2 years. Thereafter it increased and reached a maximum at 7 to 8 years and then declined slowly, but adults were found to be affected in small numbers in some villages. [The evidence that the condition is nutritional in origin is presented most convincingly. The authors' conclusion that lack of protein is responsible is on less firm ground. All that has really been demonstrated with certainty is that some component present in dried skimmed milk is curative.]

The clinical description given is excellent and in the best French tradition. In normal children the parotid glands are neither visible nor palpable. Slight modifications of size are very difficult to detect. In the initial phase the gland can swell up and subside in the same day. In some districts there is a seasonal incidence of the swelling which may be mistaken for an attack of mumps. There does not seem to be an increase of salivation and indeed some patients complained of the sensation of a dry mouth.

Seen from in front, the patient presents an abnormal configuration of the face due to a swelling of the cheek, corresponding to the border of

the parotid. The swelling varies from a simple raising of the skin to a tumour the size of the hand. When it is large, it results in a trapezoid appearance of the face. The swellings are usually bilateral. Sometimes there is a simultaneous hypertrophy of submaxillary or sublingual glands. The lachrymal glands do not appear to be affected. Palpation enables one to appreciate that the tumour occupies exactly the space of the parotid gland. There is no sign of inflammation. The orifice of Stensen's duct is patent and catheterization easy. Facial paralysis was never observed. The swelling usually increased little by little and may persist for years; on the other hand it may disappear suddenly, in most instances owing to an increase in the protein in the diet. Sialograms show irregular dilatation of the intraglandular portion of Stensen's duct and sometimes microcysts are present [beautiful pictures are shown].

Differential diagnosis is discussed at length. The condition must be distinguished from chronic infections, calculi, certain allergic states, Mikulicz disease, tumours and other rare conditions. Biopsy may help but is not usually necessary.

Histological examination of the swollen gland shows hypertrophy of the acini. The cells are big and block the lumen, which is seen with difficulty. The cellular hypertrophy is uneven, so that the shape of the acini is less regular than normal. In the atrophic final state, there is fibrosis of the gland with cystic dilatation of the ducts—a parotid cirrhosis.

A full bibliography completes this excellent account of a condition which has hitherto not been widely recognized by nutritionists.

R. Passmore

Tejada, C. & Russfield, Agnes B. **A Preliminary Report on the Pathology of the Pituitary Gland in Children with Malnutrition.** *Arch. Dis. in Childhood.* 1957, Aug., v. 32, No. 164, 343–6. [22 refs.]

"The pituitary glands of 19 Guatemalan children with malnutrition (kwashiorkor, pre-kwashiorkor and marasmus) were studied histopathologically, differential cell counts being performed. Relative percentages of basophils were usually within normal limits established by others. Acidophils were inconstantly decreased. Sparsely granulated amphophilic cells, thought to be the source of trophic hormones, were often unusually abundant. It was concluded that no morphological evidence for panhypopituitarism had been found."

Jayalakshmi, V. T., Ramanathan, M. K. & Gopalan, C. **Some Observations on the Effects of Treatment of Cases of Kwashiorkor.** *Indian J. Med. Res.* 1957, July, v. 45, No. 3, 431–8. [33 refs.]

The authors examined 29 patients with kwashiorkor. In about half of these they determined the serum sodium, potassium, calcium, and

magnesium, both on admission and after 6 weeks of treatment with a high protein diet. Prothrombin time was similarly estimated. In addition they tested the effect of adrenaline on the concentration of circulating eosinophils (Thorn's test for suprarenal deficiency) and the blood urea level. Lastly, they compared the response to treatment with 60 and 100 gm. of protein per day respectively.

The results were as follows. The concentration of the ions associated with the extracellular space, *i.e.*, sodium and calcium, was below normal on admission but rose to normal after treatment and the concentration of the ions associated with the intracellular fluid—potassium and magnesium —was normal even before treatment. The prothrombin time was prolonged on admission and became normal on treatment. The Thorn test showed an abnormal result on some occasions and the result became normal after high protein diet treatment. There was no difference when 60 and 100 gm. protein daily were compared for their therapeutic effect.

H. Lehmann

Food and Agriculture Organization of the United Nations: World Health Organization: Josiah Macy Jr. Foundation. **Human Protein Requirements and their Fulfilment in Practice. Proceedings of a Conference in Princeton, United States (1955) sponsored jointly by F.A.O., W.H.O. and Josiah Macy Jr. Foundation, New York** [Waterlow, J. C. & Stephen, Joan M. L. (Edited by)]. pp. xi + 193, 20 figs. 1957. [$2.00; 10s.]

The conference follows the usual procedure of the Josiah Macy Junior Foundation, and the report consists of more or less verbatim records of statements and discussions. It is divided into 3 sections, and each section is followed by an admirable summary which does much to clarify the arguments.

The first section (pp. 1–73) is devoted to contributions from experimental work on man and animals. The three salient conclusions in this section are that (a) experiments so far have been of short duration and under artificial conditions, so that many of the deductions cannot readily be applied to communities, (b) excess of proteins may be harmful. (c) little is known about protein storage and its relation to performance, efficiency and resistance to infection and to fatigue.

The second section (pp. 74–136) is related to human protein requirements at different ages. In this section the main conclusions are that the allowances recommended by previous committees are, at all ages, unnecessarily high. Secondly, in many parts of the world mothers and young children are not getting enough protein.

The third section (pp. 137–177) is on practical measures to increase protein intake. The only "practical" measure considered in detail is the production of high protein foods for distribution. Here there is some emphasis on disappointment in the past and caution for the future. In

Table 39 there is a detailed procedure for testing a new processed food which should provide effective safeguards.

Some of the questions raised receive incomplete answers. For instance on p. 152 the biological value of certain foods is quoted. It is then asked "What exactly do you mean here by biological value? Is it the amount necessary for the maintenance of the adult, or growth of the child, or is it a coefficient of retention?" But the answer is incomplete.

[The report contains many details of great interest and a wealth of references. It is a pity that the large-scale provision of processed foods is the only practical measure that is discussed. This is obviously expensive and fraught with danger, and there is at present insufficient evidence that, in most areas, absence of protein foods is the most important factor in malnutrition.] *Cicely D. Williams*

SPRUE

Frost, J. W., Goldwein, M. I. & Kaufman, B. D. **Studies of B_{12} Co^{60} Absorption in Malabsorption Syndrome: Results before and during Specific Therapy.** *Ann. Intern. Med.* 1957, Aug., v. 47, No. 2, 293–9, 4 figs. [10 refs.]

"1. The vitamin B_{12} absorption test is not a diagnostic test of the malabsorption syndrome.

"2. In patients who had decreased absorption of vitamin B_{12} prior to specific therapy, clinical improvement was not consistently accompanied by increased absorption while on therapy. Furthermore, one patient who showed increased absorption of vitamin B_{12} after tetracycline did not show clinical improvement.

"3. Patients with agammaglobulinemia and cystic fibrosis of the pancreas may have low vitamin B_{12} absorption."

HAEMATOLOGY

Foy, H. & Kondi, Athena. **Anaemias of the Tropics. Relation to Iron Intake, Absorption and Losses during Growth, Pregnancy and Lactation.** *J. Trop. Med. & Hyg.* 1957, May, v. 60, No. 5, 105–18, 1 chart. [Numerous refs.]

In carrying out an extensive haemoglobin survey in India, Ceylon and Africa, the authors selected the low-lying areas of the Brahmaputra and

Surma valleys, the coastal regions in Portuguese East Africa, and south of Colombo and Mombasa. The higher cooler regions selected were around Shillong and Darjeeling and in the Nilgiri Hills, southern India. Persons were selected at random from the working population of the areas, and invalids, aged persons and infants were excluded.

In India the lowest haemoglobin values were found in the damp valleys of the Brahmaputra and Surma where the mean haemoglobin for all groups was 10·9 gm. per 100 ml. and 16% of the population had 8 gm. per 100 ml. or less. The lowest levels were among pregnant women whose mean value was 9·4 gm. per 100 ml. and of whom 29% had values below 8 gm. per 100 ml. Lactating and non-pregnant women had values approximately 1 gm. per 100 ml. higher. With a few localized exceptions slightly lower values were found in Portuguese East Africa. At higher altitudes in India the values were approximately 1 gm. per 100 ml. greater than at lower altitudes, and in Ceylon mean values were higher than in Africa or India. It is considered that the higher haemoglobin values encountered at the higher altitudes are an acclimatization phenomenon and may mask the presence of anaemia.

The mean corpuscular volume, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration were normal or low in 85% of those surveyed, and patients with anaemia in this group responded to iron and had normal serum vitamin B12 levels. These indices in the remaining 15% were greater than normal and anaemia where encountered responded to folic acid with or without vitamin B12.

In discussing aetiological factors it is stated that the average European diet contains 12–20 mgm. iron daily of which 3–10% is absorbed and is sufficient for normal requirements. Approximately 27 mgm. iron are needed daily for haemoglobin synthesis and of this amount 20 mgm. are supplied from disintegrating red blood cells. For the synthesis of 3 gm. haemoglobin 10 mgm. iron and 24 gm. protein are required. The maintenance of the body's iron balance is therefore precarious and excessive losses or poor absorption may upset it. In diets with low calcium and high phosphorus and phytic acid contents, the absorption of iron falls below 3%. In most areas in India the daily iron intake is 12–40 mgm. but in Madras it may be 4–10 mgm. In spite of the higher iron content of the Indian diet the incidence of iron deficiency anaemia appears to be greater in India than in Europe. One of the reasons for this may be excessive phosphorus and phytic acid and low calcium contents of Indian diets. The bacterial flora of the gut may have an important effect on iron absorption by influencing availability of calcium. The presence of hydrochloric acid in the diet and of reducing substances such as vitamin C, protein and –SH groups will affect absorption by facilitating the reduction of ferric to ferrous iron. Folic acid also affects the absorption of iron in the presence of low gastric activity, and this, it is considered, may account for its value in some of the cases treated.

In investigating iron losses it was shown that 0·3–0·6 mgm. could be

contained in 1 litre of cell-rich sweat and 0·1–0·2 mgm. per litre in cell-free sweat. With such losses, it is suggested, a negative iron balance could occur and, together with reproductive demands in the female, account for the higher incidence of anaemia among them. Losses by menstruation vary from 3·8 to 450 mgm. and are therefore also important.

The difference in the haemoglobin values of pregnant and non-pregnant women could not be explained by changes in blood volume which would account only for variations of 10%. The opinion is given that an important cause of anaemia in Indian women is the low age of marriage which results in pregnancy and lactation " . . . when growth and blood volume expansion are still occurring. . . . Pregnancies occurring during the age of 15–20 are a greater strain on the female iron resources than are late pregnancies when growth and blood volume expansion have ceased ". It is nevertheless also stated that " The demands of the foetus, then, do not put an undue strain on maternal stores even though the dietary iron may be low " as the foetal requirement is only 300–500 mgm. iron, and that of the placenta 80–120 mgm., whereas the cessation of menstruation saves 30–400 mgm. [This appears to suggest that the unexplained high incidence of anaemia in pregnancy if caused by a deficiency may be a deficiency of substances other than iron, and one such possible substance is protein.] In lactation iron requirements initially amount to approximately 1 mgm. daily.

Malaria, it is stated, does not cause an iron deficient anaemia and anaemia remains a problem in areas from which malaria has been eradicated; it is unlikely, therefore, to be an important aetiological factor. Only 30% of patients with less than 6 gm. per 100 ml. of haemoglobin had also had a hookworm infection and no difference was found between the degree or rapidity of response of those given vermifuges and those from whom they were withheld; hookworm infection is also, therefore, excluded as a likely cause of the anaemias studied. It is further doubted whether protein malnutrition plays any important part in their genesis, as it is stated that there is no specific haematological picture associated with protein deficiency, liver damage, kwashiorkor or starvation. It is also stated, however, that none of the patients in the study had any signs of malnutrition and liver biopsies taken from some of them showed no abnormality.

[In view of this, the features of the anaemias associated with marked protein malnutrition could not be expected to be found in the series, but in view of the therapeutic responses to protein which the authors later report it appears that some protein malnutrition was present.]

Some of the iron deficient anaemias failed to respond to iron administered alone but a supplement of 50 gm. protein daily completed the cure. The authors give it as a final opinion " that although proteins may play a part in some of these anaemic conditions, it is secondary to more important and primary deficiences of iron, B_{12}, and folic acid ".

Regarding prophylaxis, 85% of tropical anaemias are stated to respond

to iron administered orally and it is therefore suggested that iron fortification of the diet should be attempted.

[This is a valuable paper. A survey as broad as this has probably not previously been carried out and the findings are of great interest and importance. As invalids and hospital patients were excluded from the study it cannot of course be expected to reflect all aspects of the problem.] *A. W. Woodruff*

NWOKOLO, C. **A Case of Sickle Cell Haemoglobin "C" Disease in Eastern Nigeria.** *West African Med. J.* 1957, Sept., v. 6 (n.s.), No. 3, 123–5.

"A case of sickle cell haemoglobin C disease in a middle-aged Ibo woman is reported. This is the first time that sickle cell haemoglobin C disease has been found in Eastern Nigeria. Its similarity to homozygous sickle cell disease is stressed."

SILVER, H. K., SIMON, J. L. & CLEMENT, D. H. *Salmonella* **Osteomyelitis and Abnormal Hemoglobin Disease.** *Pediatrics.* Springfield, Ill. 1957, Sept., v. 20, No. 3, 439–47, 1 fig. [19 refs.]

"Two cases of salmonella osteomyelitis and abnormal hemoglobin disease are reported; the first in a white boy with combined sickle cell-Mediterranean anemia and the second in a Negro girl with haemoglobin C–D disease.

"One case represents the first reported instance of salmonella osteomyelitis occurring in a patient with a mixed heterozygous hemoglobin disease while the other is the first observed in a patient with a hemoglobinopathy without sickling.

"A complete review of the literature is presented."

VENOMS AND ANTIVENENES

i. BURKITT, R. **Snake-Bites.** [Correspondence.] *Brit. Med. J.* 1957, July 20, 159.

ii. MANSON-BAHR, P. **Snake-Bite.** [Correspondence.] *Ibid.* 1957, Aug. 24, 468–9.

i. The writer of this letter observes that adder bites seem to be more frequently observed in Britain. He points out that as the number of people who have had some form of horse-serum injection increases, so will the danger of severe reactions after antivenenes. He wonders

whether such treatment is justified other than in exceptional circumstances, such as in the case of very young children. He thinks that there is little doubt that cases of gangrene in an extremity after snake-bite are more likely to be due to misapplied tourniquets. "Dare one suggest that the safest treatment for adder-bite in this country is to admit the patient to hospital, and do nothing except 'careful observation'? "

ii. Sir Philip Manson-Bahr points out that the public often has a false impression of the dangers from the bite of the common adder, *Vipera berus*. He suggests that the known evidence is against the dangers being as great as they are popularly supposed to be. The venom of the common adder in Britain is of low toxicity, rarely—if ever—kills adult human beings and is dangerous only to small children. He quotes figures to show that only some 7 fatalities from viper bite have been recorded in the United Kingdom in the last 50 years and only 2 were registered between 1940 and 1948. The danger to life arises much more from the heroic methods of treatment so often applied.

The adder only strikes human beings in self-defence when rudely disturbed. The venom when injected to a depth of less than ½ an inch is rapidly absorbed and toxic symptoms are noted within 2 to 3 hours. Usually all that has to be done is to put the patient to bed and give copious draughts of glucose. Heroic methods (incising, sucking, delayed tourniquet) should be abandoned. Opinions are divided as to the need for viper antivenene. It is popularly demanded, because it is known to be essential in the more dangerous forms of snake bite, as in the tropics. If it is given for viper bites in Britain it should be injected deeply and subcutaneously and not intravenously, because of the danger of anaphylaxis.

Attention is drawn to the use of carbolic soap to neutralize and delay absorption of the venom [this *Bulletin*, 1949, v. 46, 867]. It should be rubbed into the wound or injected in 5% solution into the loose subcutaneous tissues at the site of the fang mark. This simple method is said to be harmless and practical. *H. J. O'D. Burke-Gaffney*

Del Vecchio, V. Il potere antidotico della clorofilla nei riguardi del veleno di *Latrodectus tredecimguttatus*. [**Antidotal Action of Chlorophyll against the Venom of** *Latrodectus tredecimguttatus*] *Igiene e San. Pubblica*. Rome. 1957, May–June, v. 13, Nos. 5/6, 265–8.

The English summary appended to the paper is as follows:—

"A 0·50 per cent chlorophyll (Chlorophyllin Allen) solution after 3 hours contact with the poison of *L. tredecimguttatus* at 37° and 20°C exerts an antidotal action against even $10LD_{50}$ poison concentration."

TOXOPLASMOSIS

Jirovec, O. Badania nad toksoplazmozą w Czechosłowacji. [**Investigations on Toxoplasmosis in Czechoslovakia**] *Wiadomości Parazytologiczne.* Warsaw. 1957, v. 3, Nos. 2/3, 199–204. English summary.

Cardoso, Rita A. de A., Guimarães, F. N. & Garcia, A. P. Toxoplasmose congênita. [**Congenital Toxoplasmosis**] *Mem. Inst. Oswaldo Cruz.* 1956, Dec., v. 54, No. 3, 571–97, 17 figs. (4 coloured) on 6 pls. [32 refs.] English summary.

6 cases of human congenital toxoplasmosis are described in detail. They were discovered in a series of 1,200 necropsies of foetuses or newborn babies in Rio de Janeiro; 5 were premature, born between the sixth and eighth months of pregnancy, and the sixth was born dead at full term. 1 baby—a premature at the sixth month—lived 14 days and another for 31 days after birth; 2 lived less than 1 day, and 2 were stillborn. In 4 cases acute fever had affected the mother either during pregnancy or shortly before, and in 2 of these this attack of fever was followed by uterine bleeding and premature delivery.

Pseudocysts of *Toxoplasma* were found in the brain, eye, heart, kidneys and suprarenals of some or all of the cases; the organisms were absent from the spleen, liver, lungs and other organs. In 1 case pseudocysts were also found in the placenta, and infected fibroblasts were numerous in the umbilical cord; it is suggested that this tissue might be used for culture of the organism. Necrotic areas in the brain may be wrongly diagnosed and it is important in such cases to stain material with Giemsa's stain or by the periodic-acid-Schiff technique in order to see the parasite. *P. C. C. Garnham*

Meyer, H. & Mendonça, I. de A. **Electron Microscopic Observations of *Toxoplasma* "Nicolle et Manceaux" in Thin Sections of Tissue Cultures.** *Parasitology.* 1957, June, v. 47, Nos. 1/2, 66–9, 9 figs. on 6 pls.

Cultures of *Toxoplasma* were fixed while in a hanging drop for 10–20 minutes in 1% osmic acid buffered at a *p*H 7·6–7·8 with veronal acetate; after dehydration they were cut out and embedded in *n*-butyl methacrylate. Sections of a thickness of 40–80 mμ were prepared with a Porter-Blum microtome. As well as much cell debris and degenerating forms of the organism, large numbers of intact, free and intracellular forms of *Toxoplasma*, some in rosette formation, were seen. No organelles of locomotion were detected, but many other structures were observed. A thin, striated periplast appears to surround the organism

and this becomes thickened at the two poles. At the peripheral pole, the membrane (now double) becomes thickened into a ring to which are connected internally long, darkly staining structures of an unknown nature. At the opposite pole there is a distinct opening. Neither this nor the structure at the other end is thought to be connected with the uptake of food; both structures are more probably concerned with the secretion of a lysin to help the parasite enter a cell. The nucleus has a membrane, a nucleolus and chromatin dots; Golgi apparatus and mitochondria appear to be present in the cytoplasm. *P. C. C. Garnham*

Roger, F. & Roger, Annie. Premiers résultats concernant la congélation de *Toxoplasma gondii*. [**First Results concerning the Freezing of** *Toxoplasma gondii*] *Bull. Soc. Path. Exot.* 1957, Mar.–Apr., v. 50, No. 2, 208–11.

In preliminary trials with red blood cells it was found that suspension of the corpuscles in a "saccharosed" isotonic solution followed by slow freezing and rapid thawing largely prevented haemolysis (*i.e.* the membranes of the cells were prevented from rupturing). The same method was applied to *Toxoplasma gondii* obtained from ascitic fluid of mice on the 5th day after inoculation and diluted 1 in 2. 0·5 cc. amounts were distributed in 5 cc. ampoules and were frozen slowly to −18°C., and after 24 hours at this temperature were maintained at −35°C. The contents were thawed after various intervals by immersing the ampoules in boiling water and they were then inoculated into mice. After 1 day's preservation all the mice became infected. After a week, 4 out of 8 mice became infected; after a month 1 out of 8 mice became infected. After longer preservation no infection of mice took place. The authors suggest that storage at still lower temperatures might give better results and in an addendum draw attention to the work of Eyles *et al.* [see this *Bulletin*, 1957, v. 54, 218] which showed that *Toxoplasma* survived for 209 days if kept in a glycerinated suspension at −80°C.

P. C. C. Garnham

Jacobs, L. & Lunde, M. N. **Hemagglutination Test for Toxoplasmosis.** *Science*. 1957, May 24, v. 125, 1035.

The antigen for this test is prepared by harvesting the peritoneal exudate of mice infected with *Toxoplasma gondii*, mixing it with saline buffered at *p*H 7·2 and centrifuging; the organisms are then suspended in 10 times their weight with distilled water and are kept for at least 18 hours at 5°C. with occasional shaking. The final antigen is the water-soluble components of the parasite in a 1 in 20 dilution obtained by mixing the supernatant fluid from a last centrifugation with an equal volume of 1·7% saline. The red cell (sheep's) suspension is prepared according to the method of Stavitsky [*Bull. Hyg.*, 1954, v. 29, 1204].

and is best used at a concentration reading between 0·4 and 0·6 by Beckman spectrophotometry.

The results of this test on various human sera were compared with those of the dye test and good agreement was obtained in 42. In 100 other tests pooled batches of antigens gave equally good results, and only 1 serum positive to the dye test was negative in the hemagglutination test. The serum from a case of toxoplasmosis with lymphadenopathy became positive to the latter test slightly later than the dye test, but much earlier than the complement-fixation test.

P. C. C. Garnham

Jacobs, L. & Lunde, M. N. **A Hemagglutination Test for Toxoplasmosis.** *J. Parasitology.* 1957, June, v. 43, No. 3, 308–14, 1 fig. [14 refs.]

This paper is an expanded version of a short report in *Science* [above] dealing with a new serological reaction for the diagnosis of toxoplasmosis. The method of preparation of the red cell system is here given in detail, and the complete results are presented, though it is pointed out that further work is necessary to produce more stable and perhaps more potent antigens. The best antigens are derived from peritoneal exudates which contain few white cells. The specificity of the antigen was tested by comparing the results of using (a) *Toxoplasma*, (b) mouse spleen and (c) *Besnoitia jellisoni* extracts in parallel haemagglutination tests with a human serum giving a dye test titre of 1 in 1,024. Only the *Toxoplasma* antigen inhibited agglutination of the erythrocytes sensitized with *Toxoplasma*.

The test gives a good prospect of successful adaptation in routine laboratories.

P. C. C. Garnham

Varela, G., Roch, E. & Torroella, J. Estudio de toxoplasmosis ocular. [**Study of Ocular Toxoplasmosis**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1956, June, v. 16, No. 2, 17–19. English summary.

The authors record the results of an investigation on ocular toxoplasmosis in rabbits, pigs and man, carried out in Mexico. In one experiment 49 rabbits were inoculated with *Toxoplasma* into the conjunctiva, anterior chamber, the vitreous body or the retrobulbar region. The animals died within 12 days, with symptoms and lesions of conjunctivitis, keratitis and iritis, while parasites were seen both in the eyes and in some of the internal organs (lungs, liver). Examination of the eyes of 817 pigs revealed in 223 cases lesions in the choroid with parasites in 87 of them. Finally, the dye test was performed on 67 patients, 43 of whom showed signs of chorioretinitis and 24 iritis: positive reactions were obtained in 23 of the former and 13 of the latter cases.

C. A. Hoare

Fialho, S. A., Teixeira, I. & Paraguassú, Lydia. **Experimental Toxoplasmic Conjunctivitis in Rabbits.** 10 pp., 2 figs. 1956, Dec. Rio de Janeiro: Eye Clinic, Faculdade Nacional de Medicina.

This is a study of experimentally produced toxoplasmic conjunctivitis in rabbits (and a pigeon), of interest because eye lesions may prove to be a source of infection of man. The condition was produced by placing a cotton ball soaked in infected peritoneal fluid in the rabbit's eye for 1 to 4 hours, and in two-thirds of over 80 rabbits so treated, conjunctivitis due to *Toxoplasma gondii* followed.

The conjunctivitis may be benign, subacute or very severe with necrosis leading to death between the eighth and twelfth days. The cervical lymph glands are always involved, and the blood becomes invaded as early as the fourth day of infection; the interior of the eye-ball is rarely affected, though meningo-encephalitic lesions are frequent. The parasites are either enclosed in pseudocysts or lie free, the former structures appearing by the fourth day. The inflammation is accompanied by polymorphonuclear leucocytes in the first week, and by monocytes later. A similar pathological picture is present in the satellite lymph glands.

Toxoplasmic conjunctivitis of a benign type also arises after intra-arterial inoculation in rabbits and after intra-muscular inoculation in pigeons. *P. C. C. Garnham*

DERMATOLOGY AND FUNGUS DISEASES

Hounié, P. & Artagaveytia-Allende, R. C. Encuesta sobre la sensibilidad al agente de la blastomicosis sudamericana. [**Surveys on the Sensitivity to the Causal Organism of South American Blastomycosis**] *An. Facul. de Med. Montevideo.* 1957, Jan.–Feb., v. 42, Nos. 1/2, 27–32. English summary.

In a report by Mackinnon *et al.* [this *Bulletin*, 1954, v. 51, 730] on a study of the specificity of the paracoccidioidin skin test, a method of preparing the test antigen is described. The same method was employed in the present work, except that incubation was at only 38°C. for 45 days, and the culture, in the yeast phase, gave a high yield of antigenic material. The potency of the new paracoccidioidin was determined by comparison with the older preparation in tests on the same subjects.

3 patients suffering from South American blastomycosis, in the Hospital Maciel, Montevideo, were found to react to the new paracoccidioidin at 1 in 100, but to give negative results to similar tests with histoplasmin, coccidioidin and sporotrichin. Control tests with paracoccidioidin were made on 30 people, presumed to be free from mycotic taint, who worked in Montevideo and its neighbourhood, and all gave

negative results at 1 in 10. Further tests were made on 12 patients in the hospital in Mercedes, near the Rio Negro, and 3 of these reacted to the test at 1 in 10; only 1 of the 3 was available for retesting at 1 in 100 and he gave a positive result. It is significant that these 3 reactors were all workers in the neighbouring forest, and the last patient with the disease, studied in the hospital in Montevideo, had worked for years in the forests at the mouth of the Rio Negro and the estuary of the Rio Uruguay. The last " control " tests were made on a group of 12 charcoal burners from the Rio Negro forests, and 5 were found to be positive at 1 in 10; 3 of these were retested at 1 in 100 and were found positive. All reactors to the paracoccidioidin test were also tested with histoplasmin, to which none reacted.

The results obtained bear out the specificity of the paracoccidioidin test and indicate the possible existence of an endemic focus of the disease in the forests of the Rio Negro. *J. T. Duncan*

da Silva, W. B. Registro de um caso de blastomicose Sul-Americana generalizada com comprometimento cardíaco. [**A Case of Generalized South American Blastomycosis with Cardiac Involvement**] *Anais Facul. Med. Univ. do Recife.* 1956, Dec., v. 16, No. 2, 235–44, 6 figs. on 3 pls. [11 refs.]

TROPICAL OPHTHALMOLOGY

Akopian, A. T. & Pukhner, A. F. **The Action of Synthomycin, Chloramphenicol and Aureomycin on Secondary Infections accompanying Trachoma.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1957, v. 28, No. 3, 420–23. [Translated from Russian.]

" (1) Synthomycin, aureomycin and chloramphenicol possess a wide antibacterial spectrum against both Gram-positive and Gram-negative microflora accompanying trachoma infections. Various types and strains of bacteria show different degrees of resistance to the above antibiotics. The Morax-Axenfeld bacillus has proved to be the most resistant, and *C. xerosis* the least resistant.

" (2) On local application of synthomycin, chloramphenicol and aureomycin, bacteria complicating trachoma infections disappeared on the third day in 40·3 per cent, on the sixth day in 81·2 per cent and on the tenth day in 83·8 per cent of patients.

" (3) Comparative studies of the antibacterial activity of 10, 1, 0·5 and 0·25 per cent emulsions of synthomycin have shown that there is no significant difference in the activity of the first two concentrations, whereas the 0·5 and 0·25 per cent emulsions are less active."

Rodger, F. C. **Acute Ocular Onchocerciasis and its Treatment.** *Brit. J. Ophthalm.* 1957, Sept., v. 41, No. 9, 544–57, 9 figs.

The author was the Director of the West African Ophthalmic Survey, sponsored by the British Empire Society for the Blind. He is in the process of reporting on the results of this survey; a comprehensive report has not yet appeared, and this is the third in a series of short papers to be published. This method of presentation of his results has its disadvantages: for example, in this paper he makes a number of cross references to other publications, some of which have not yet appeared, and others being still in the course of preparation.

The paper is interesting, and should be studied by any medical person concerned with blindness in general, and onchocerciasis in particular. The conclusions are as follows:—

"(1) Acute manifestations of ocular onchocerciasis are seen as a limbitis, a sclerosing keratitis, and as an anterior and posterior uveitis.

"(2) Differences in the African eye from the European eye that might confuse the clinical picture are discussed.

"(3) The clinical signs and symptoms of onchocercal limbitis, sclerosing keratitis, and anterior and posterior uveitis are fully described.

"(4) The lesions are usually seen in a sub-acute or chronic stage, but it is believed that in most of them there has been or will be an acute crisis at some time or other.

"(5) After a few days the acute phase usually settles down, adopting once again its sub-acute or chronic course; in some instances, it is the acute manifestation which occurs first.

"(6) It is during the acute attack that blindness is most likely to occur and consequently it is believed that it is most important to treat acute cases.

"(7) The treatment found to be most successful during the acute phase was an initial intravenous injection of 10 million units of TAB vaccine, followed as soon as the temperature was normal by 10 g. diethylcarbamazine (Hetrazan) orally. The eye becomes quiet within 12 hours of the non-specific protein therapy; although on exposure to the filaricide, lacrimation and photophobia return, nevertheless the symptoms are not so acute as before. Resolution appears to be more likely to occur when protein therapy is administered first.

"(8) A discussion of the clinical signs and symptoms in the light of the findings of other workers is given. It is noted that the general consensus of opinion is that the keratitis is a sub-acute condition and the anterior uveitis an insidious condition. The observations and results in the present paper show this not to be the case. Reasons for the discrepancies between the findings of various authors are put forward.

"(9) It is suggested that the intensity of the clinical symptoms depends upon quantitative and immunological factors. The evidence of this is to be reported in a further communication.

"(10) The description given of an exogenous posterior exudative uveitis due to onchocerciasis is believed to be the first publication of this finding." *D. P. Choyce*

TROPICAL ULCER

GORECKI, P. Contribution au traitement des ulcères phagédéniques. [**Treatment of Tropical Ulcer**] *Ann. Soc. Belge de Méd. Trop.* 1957, Apr. 30, v. 37, No. 2, 263–7.

The author, writing from the Belgian Congo, points out that tropical ulcer is a disease of regions lacking medical care, and is rare in areas where medical services are well established. Prompt attention greatly reduces the number of cases. It is the established policy to maintain under out-patient supervision all wounds of the lower limbs, even though these have been sutured in the fresh state. Thus the duration of ambulant treatment is shortened and the development of tropical ulcer is avoided. Although the majority of tropical ulcers develop on the legs they may also be found on the arms, chest and abdomen.

The author bases his advice on the observation and treatment of 750 patients, whose ulcers varied in size from 25 to 150 sq. cm. They were seen among the hospital population of Léopoldville, where the medical service is elaborate. Despite a most careful investigation, fuso-spirillar organisms were recognized in only 20% of cases. No other agents were found and this suggests that the tissue reaction, rather than the organism, plays the more important role. Tropical and varicose ulceration are closely related.

Treatment comprises: (i) thorough curettage under an anaesthetic; (ii) application of an oily emulsion of a delayed-action penicillin, followed by a boot of Unna's paste, or of a similar paste applied by brush to successive layers of a bandage. This is left in position for 2 weeks, even though pus may exude or flow out beneath it: the pus is always sterile; (iii) infiltration of the sympathetic ganglionic chain with 15 ml. of 1% Procaine at the level of the spine of the second lumbar vertebra, repeated twice weekly until healing is obtained. [Somewhat facile instructions are given on this procedure.]

The results obtained were remarkable. All but 17 of the 750 patients received only ambulant treatment, and the dressing did not impede their activity. Complete healing, which was sometimes helped in the later stages by cod-liver oil dressings, was obtained in 20 to 45 days, and no case broke down later. The scars were soft and inconspicuous. [This simple treatment deserves wide adoption throughout tropical Africa.]

J. H. Walters

Lejeune, P. Note sur l'emploi d'un nouvel antibiotique " La Citrinine " dans le traitement de l'ulcère tropical. [**A Note on the Use of a New Antibiotic, Citrinin, in the Treatment of Tropical Ulcer**] *Ann. Soc. Belge de Méd. Trop.* 1957, Feb. 28, v. 37, No. 1, 139–46. [17 refs.]

A total of 17 patients with tropical ulcer were treated by local application of citrinin, an antibiotic obtained from *Penicillin thomii*; this antibiotic is a yellow crystalline substance almost completely insoluble in pure water, very toxic when taken by mouth, but topically active against *Proteus*, *Bacillus subtilis*, *Chromobacterium mycoides*, *Escherichia coli*, and staphylococci, among others. *Proteus* is frequently isolated from these ulcers. The ulcers were typical tropical ulcers, 5 to 18 cm. in diameter; 17 were on the lateral or antero-lateral aspect of the legs, on or above the malleoli and 2 were at the back of the foot. They were single and painful, not associated with fever or glandular enlargement, their edges were raised and swollen, had a greenish-grey appearance and were adherent, and in one case reached down to the bone.

No treatment had been given before except in 3 cases in which unsuccessful irregular treatment had been given. They were mostly of recent origin. *Borrelia* [*Treponema*] *vincenti* and *Fusiformis fusiformis* were demonstrated in 5 of the untreated cases.

Finely powdered citrinin, 0·5 gm., and bipotassium phosphate, 0·875 gm., were placed in a flask with 100 ml. of distilled water to make a suspension. This was absorbed into gauze, applied to the ulcer and the whole covered by lint. The dressing was renewed twice daily.

Later, the 0·5% suspension was incorporated in an ointment of vaseline and lanolin, equal parts, which was applied daily.

By the end of 8 days the typical flora had disappeared and the ulcer was clean except in one case in which curetting was required. The ointment was then applied and, after another 15 days, in the less extensive lesions the tissue repair was sufficiently advanced for the ulcers to be considered as cured.

[That is to say, in this series in 3 to 5 weeks (one extensive ulcer in 6 weeks) the ulcers were cured.] *L. E. Napier*

MISCELLANEOUS DISEASES

Di Egidio, M. La calcolosi dell'apparato urinario nello Yemen. [**Urolithiasis in the Yemen**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1957, June, v. 38, No. 6, 277–90, 3 graphs & 6 figs. [20 refs.] English summary (8 lines).

The author, who is the Director of the radiological department of the Royal Ahmed I hospital at Taiz (Yemen), gives an account of the

incidence of urolithiasis as ascertained by radiological examination (direct renal and vesical, and pyelography) during the period from April 1952 to April 1957. In all, 793 males, and 106 females were examined and 244 males and 10 females had urinary calculi. Nearly 52% of those affected were between 20 and 40 years of age. The calculi were mainly composed of calcium oxalate.

Discussing the reason for this high incidence the author gives details of the diet of 17 men and 3 women between 20 and 60 years old. A shepherd had the lowest diet of only 1,433 calories per day, and there was a general deficiency in fats. [There is a miscalculation in table 5, No. 14, where the total daily calories are given as only 1,104.] He excludes any association with the hardness of the water supply in the 3 main cities (from wells), and also urinary schistosomiasis, where of 72 ascertained cases only 3 persons had calculi, but draws special attention to the association of increased oxalate excretion with the extensive consumption of *khat* (the leaves of *Catha edulis*) [see this *Bulletin*, 1945, v. 42, 658, 659]. He explains the frequency of urolithiasis as being due to this and certain other not precisely definable factors, and states that Yemen must now be considered as being in the first rank of countries where urolithiasis is common.

[The second graph shows that no less than 35 of 190 children under 10 years old had calculi and the author himself states that they do not eat *khat*. The numbers given in this graph add up to 10 more than the total given positive.] *W. K. Dunscombe*

Carcassi, U. & Agnisetta, S. Positività del test della proteina C reattiva nel favismo ittero-emoglobinurico. [**Positive Findings with the C Reactive Protein Test in the Haemolytic Crisis of Favism**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1957, July, v. 38, No. 7, 371–6, 2 figs.

The English summary appended to the paper is as follows:—

"The authors have carried out a thorough investigation of protein C test during the haemolytic crisis of favism. This test has been positive 26 times out of 32. The authors suggest some hypothesis on the signification of this positivity."

Carcassi, U., Lenzerini, L. & Contu, L. Il glutatione eritrocitario nel favismo ittero-emoglobinurico. [**Erythrocytic Glutathione in the Haemolytic Crisis of Favism**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1957, July, v. 38, No. 7, 335–48. [29 refs.]

The English summary appended to the paper is as follows:—

"The authors have summarized the literature on the relationship between glutathione and haemolysis under toxic conditions. In primaquine-induced anaemia glutathione seems to play a primary role and, as

it has been affirmed in Italy that there is a possible deficit of glutathione in the haemolytic crisis of favism, the authors have carried out some control work. In their opinion a glutathione-deficit is at the base of favism."

Gault, E. W. & Webb, J. K. G. **Tropical Eosinophilia. Hepatic Lesions related to Presence of Nematode Larvae.** *Lancet.* 1957, Sept. 7, 471–2, 1 fig.

The authors of this note, from Vellore, South India, refer briefly to the various theories as to the cause of tropical eosinophilia. The demonstration that "visceral larva migrans" [this *Bulletin*, 1956, v. 53, 1457, 1458] was manifested by hepatomegaly, pulmonary infiltration and eosinophilia chronic in children (*Pediatrics*, 1952, v. 9, 7), suggested that a similar mechanism might be responsible for tropical eosinophilia. Hepatomegaly does occur in this condition, especially in young children, and the authors have seen an enlarged liver return to normal concurrently with the response of the respiratory symptoms to arsenical treatment.

In 4 children with the clinical features of tropical eosinophilia, liver biopsy showed a striking cellular infiltration, mostly eosinophilic, in the portal triads. In an additional case laparotomy revealed the presence of two areas on the anterior surface of the liver where about a dozen small whitish patches, 1–2 mm. in diameter, were seen. Histological section from these areas showed widening of the portal tracts everywhere by massive cellular infiltration almost entirely eosinophilic. There were also occasional granulomatous foci replacing normal tissue, usually adjacent to the portal tracts. After prolonged search, 5 small pieces of tissue were found, which were probably derived from larvae: one of them [shown in a figure] was in fact identified as the anterior end of a nematode larva which could not, however, be identified more completely. It would seem that in tropical eosinophilia the liver may undergo pathological changes essentially similar to those seen in "visceral larva migrans" and the authors suggest the invasion of liver and lungs by nematode larvae as a likely cause of tropical eosinophilia [see also Danaraj, this *Bulletin*, 1957, v. 54, 1342]. *H. J. O'D. Burke-Gaffney*

Chambon, L., Staub, A. M. & Bourdet, M. Constitution antigénique de *Malleomyces pseudomallei*. III.—Mode d'extraction et premiers essais de purification de l'antigène d'enveloppe K. [**Antigenic Constitution of *Malleomyces pseudomallei*. III. Methods of Extraction and First Attempts to Purification of the Capsular K Antigen**] *Ann. Inst. Pasteur.* 1957, Sept., v. 93, No. 3, 376–89, 2 pls. & 1 fig. [10 refs.]

The English summary appended to the paper is as follows:—

"The authors have tried to isolate the K antigen from the cells of *M.*

pseudomallei. They succeeded by heating the cells at 100° C in neutral distilled water; but it is necessary that the cells be cultured on a cellophan paper covering the agar surface if an extract without agar is to be obtained.

"It seems that the K antigen represents a stable polysaccharide essentially consisting of glucose and a not yet determined sugar, linked to a very easily hydrolysable fraction of unknown nature."

[See this *Bulletin*, 1957, v. 54, 92 *bis*.]

Nguyen-Van-Ai, Nguyen-Hoai-Duc & Nguyen-Ba-Khoi. Note sur un cas mortel de septico-pyohémie à bacille de Whitmore. [**Note on a Fatal Case of Septicaemia caused by Whitmore's Bacillus**] *Bull. Soc. Path. Exot.* 1957, Jan.–Feb., v. 50, No. 1, 11–17, 1 chart.

The author briefly reviews the recent French literature on the diagnosis, treatment and epidemiology of melioidosis, and describes a fatal case. The patient, a man aged 40, presented with symptoms and signs suggestive of typhoid fever, but the correct diagnosis was made 48 hours after his admission to hospital when *Pfeifferella whitmori* was isolated from a blood culture. The organism was recovered from blood culture on a subsequent occasion, twice from the urine, and once from the sputum. *In vitro* sensitivity tests at first showed the organism to be sensitive to chloramphenicol, and clinical improvement followed treatment with this drug. During the second half of the illness, however, the strains of *Pf. whitmori* isolated from the patient were completely resistant to chloramphenicol, but *in vitro* tests, it is claimed, showed the organisms to be sensitive to combinations of tetracycline, erythromycin and chloramphenicol. The apparently synergic combination of chloramphenicol and erythromycin was administered for 14 days during the patient's second relapse, but despite this treatment he died on the 59th day of the disease.

The usual cultural and animal inoculation methods failed to recover *Pf. whitmori* from the sputum. When a large amount of sputum was implanted under the skin of a guineapig, however, the animal developed melioidosis and from the lesions *Pf. whitmori* was obtained in pure culture.

Serological tests were performed on 3 occasions; the results obtained differ from those of other observers in that the agglutination test became positive while the haemagglutination and complement-fixation reactions remained negative. The author attributes these results to the use of a heated suspension of *Pf. whitmori* as the antigen for the agglutination reaction. *J. Douglas Sleigh*

PARASITOLOGY: GENERAL

Tecce, Nicola & Villari, A. Contributo statistico sulla diffusione delle parassitosi intestinali. [**Statistical Calculations on the Diffusion of Intestinal Parasites**] *Acta Med. Italica.* 1957. June, v. 12, No. 6, 150–56.

The authors, writing from the Clinic for Infective and Tropical Diseases, and the Institute of Hygiene of the University of Naples, describe the results of a clinical-epidemiological investigation in 1953 on the distribution of infection by intestinal parasites in the area of Castellammare, and illustrate mathematically the probability of infection by the various parasites found.

1,000 samples of faeces were examined, 712 from persons living in the rural, and 288 from those in the urban area. In 56% some form of intestinal parasite was found and more than 1 variety was quite frequent. Infection was greater in the rural than in the urban area.

In the rural areas *Ascaris* affected about 1 in 3, and ankylostomes about 1 in 4. *E. histolytica* was found in only 0·2% and cestode infection was negligible. The great difference in ankylostome infection between the urban and rural areas is emphasized and the greater liability of adults as compared with children (21% : 5%).

Calculations relating to the probability of infection with various forms of intestinal parasites are given, and the authors conclude that the probability is greater in the rural area; that children are more liable to *Ascaris* infection, but that in contrast adults are more liable to *Ancylostome* infection. *W. K. Dunscombe*

Nagaty, H. F. & Rifaat, M. A. **A Parasitological Survey of the Kharga and Dakhla Oases in 1952 and of the Dakhla Oases in 1955.** *J. Egyptian Med. Ass.* 1957, v. 40, No. 6, 444–7.

"1. No malaria cases were found.

"2. Urinary bilharziasis is very uncommon.

"3. No *Ancylostoma* or *Ascaris* infections were met with.

"4. Intestinal protozoal infections and such helminthic infections that do not require a stage of development outside the human body as *H. nana* are the commonest intestinal parasitic infections among the inhabitants of the two oases.

"5. Bilharzia transmitting snails are absent."

Brázdová, K. & Aldová-Klečková, Eva. Zkušenosti s parasitologickým vyšetřováním obyvatelstva provincie Severní Hamgen v Koreji. [**Experiences with the Parasitological Examination of the Inhabitants of the Province of North Hamgen in Korea**] *Československ. Epidemiol., Mikrobiol., Imunol.* Prague. 1957, v. 6, No. 3, 186–7.

In an examination of stools from 6,094 inhabitants of the North Hamgen province of Korea, eggs of *Ascaris lumbricoides* were found in 4,112 (67·5%), *Trichuris trichiura* in 609 (10·0%), *Ancylostoma duodenale* in 360 (5·9%), *Taenia* sp. in 71 (1·1%), *Clonorchis sinensis* in 6, *Strongyloides stercoralis* in 3 and *Fasciolopsis buski* in 1 instance. In a group of 200 schoolchildren *Ascaris* was present in 98% and *Trichuris* in 30%, and *Ancylostoma* was present in 20% of 200 coal miners. Eggs of *Paragonimus westermani* were found in 85 of 3,893 (2·2%) specimens of sputum. Examination of 336 stools for the presence of protozoa showed *Entamoeba histolytica* in 135 (41%), *Giardia intestinalis* in 12 (3·5%) and *Trichomonas intestinalis* in 88 (26·0%). *D. J. Bauer*

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Singh, K. R. P. & Micks, D. W. **The Effects of Surface Tension on Mosquito Development.** *Mosquito News.* 1957, June, v. 17, No. 2, 70–73, 1 fig.

"The effects of various surface tensions upon pupal development and adult emergence were studied in six strains of mosquitoes. *Culex pipiens*, *Culex fatigans*, *Culex fatigans* (F) and *Culex molestus* were found to develop normally in water with lower surface tensions whereas *Aedes aegypti* was found to prefer higher ones. *Anopheles quadrimaculatus* was the least adaptable to changes in surface tension, showing a limited range (53–73·5 dynes/cm) in which normal development could occur."

Ziegler, L. W. **A Practical, Long-Lasting Emulsion Type Larvicide.** *Mosquito News.* 1957, June, v. 17, No. 2, 74–6.

Adjustment, by means of a hydrometer, of the specific gravity of an emulsion concentrate of DDT by adding suitable amounts of a light fuel oil (SG 0·0852) to give a low specific gravity (0·990–0·995 recommended) to the mixture is the basis of the larvicide formulation described here. This minimizes settling out of the insecticide in a container or in treated waters. Some figures are given of formulations. In one, for example, 40 gallons of larvicide consists of 28 gallons of a 30% DDT concentrate, 10·5 gallons of the fuel oil (SG 0·0852), and 1·5 gallons of the emulsifier, Triton X 171. Dilution of this with water of the breeding place is in the ratio of 9 parts water to 1 part of the prepared emulsion. Good keeping

quality without breaking or creaming in tanks for several weeks is reported and also 3 weeks' control with one treatment in pits breeding *C. pipiens* when applied at 1 part DDT to 1,500,000 parts water.

D. S. Bertram

Gjullin, C. M. & Isaak, L. W. **Present Status of Mosquito Resistance to Insecticides in the San Joaquin Valley in California.** *Mosquito News.* 1957, June, v. 17, No. 2, 67–70.

Resistance of larvae of *Aëdes nigromaculis* and *Culex tarsalis* in California to several chlorinated hydrocarbon insecticides was sufficient by 1951 to lead to their being discontinued in favour of the organophosphorus compounds, EPN, parathion and malathion. Resistance of larvae and adults of *C. tarsalis* to malathion is now reported, the insecticide being no longer effective for control. There is some resistance to EPN but no resistance of this species to parathion; nor is there evidence of cross-resistance between these organo-phosphorus compounds. Malathion is still effective against larvae of *A. nigromaculis*.

D. S. Bertram

Knipling, E. B. & Sullivan, W. N. **Insect Mortality at Low Temperatures.** *J. Econom. Entom.* 1957, June, v. 50, No. 3, 368–9.

There have been many instances of insects of agricultural or public health importance, such as the yellow fever mosquito *Aëdes aegypti*, being transported from one place to another on or in aircraft. In these days, however, especially with jet travel, these dangers seem to be lessening as aircraft fly at greater altitudes than before, where outside temperatures may fall as low as −42°C. to −65°C. at 40,000 feet. Under these conditions, therefore, insects which become caught on the outside or in unheated parts of the aeroplanes have less chance of survival than those in lower flying aircraft.

In order to determine the effects of such low temperatures on the mortality rate of insects, 8 species of arthropods were exposed to a range of temperatures from 0°C. to −30°C. for 60 minutes. In each experiment, the immediate knockdown and the subsequent kill which resulted from the freezing were taken into account and the percentage mortality calculated.

Results showed that *A. aegypti* showed a 100% kill at −10°C. and the others at −15°C. *Tribolium confusum* and *Dermacentor variabilis* were the least susceptible and had an unexplained percentage survival of about 10% at −20°C., even though a complete kill was recorded at −15°C. and −30°C. It is not stated whether this result is thought to be significant. In a comparison between *Musca domestica* and *A. aegypti* at −20°C., a 100% kill of the mosquito was recorded in 6

minutes, and a 100% kill of the house-fly in 30 minutes. These results seem to indicate that most species of insect of economic importance could not survive temperatures of less than −20°C. for much more than 30 minutes. *D. S. Saunders*

See also p. 1405, Pan American Sanitary Bureau, **Manual of Operations for an *Aedes aegypti* Eradication Service.**

See also p. 1404, Eads & Strom, **An Additional United States Record of *Haemagogus equinus*.**

Murray, W. S. **Investigations on the Bionomics of *Culicoides obsoletus* (Meigen) and other Biting Midges at Mount Solon, Virginia.** *Mosquito News*. 1957, June, v. 17, No. 2, 77–82, 6 figs. [13 refs.]

Much of the sampling for adult midges was done with light traps from dusk to dawn. *Culicoides obsoletus* formed 95% of catches of many thousands of midges and was the chief man-biting species in or near forest at night. The numbers caught by light traps increased through the night. Of 14 species taken, *C. biguttatus*, *C. guttipennis* and *C. stellifer* also bit man, the last species by day. All species required moisture and vegetational shade, and commonly, sand rich in humus for breeding. Treehole breeding was observed, including for *C. obsoletus*. Breeding places at stream edges, in heaps of leaves and in treeholes are illustrated by photographs. *D. S. Bertram*

Pampiglione, S. Le miasi oculari nell'uomo. [**Ocular Myiasis in Man**] *Nuovi Ann. d'Igiene e Microbiol.* 1957. May–June, v. 8, No. 3, 241–62. [Numerous refs.]

The English summary appended to the paper is as follows:—

"The author schematically describes the present state of studies on ophthalmomyiasis from the etiological, pathological and clinical point-of-view, with particular reference to the infestations caused by the larvae of *Oestridae*."

[There is an impressive list of references.]

Mehrotra, K. N. & Smallman, B. N. **Ovicidal Action of Organo-Phosphorus Insecticides.** [Correspondence.] *Nature*. 1957, July 13, v. 180, 97–8.

It has been suggested that organo-phosphorus insecticides exert their toxic effect by inhibition of the acetylcholinesterase of the nervous system.

But this is anomalous because the compounds are toxic to eggs treated before the nervous system has differentiated; also eggs treated before cholinesterase activity appears in them continue to develop normally but fail to hatch. However, since it is thought that the ultimate toxic effect of anticholinesterases is the abnormal concentration of acetylcholine, the authors have examined the acetylcholine content and cholinesterase activity during the embryonic development of normal and parathion-treated eggs of the house-fly (*M. domestica*).

At 28° C. embryonic development of *Musca* eggs takes 12 hours. The results showed that during the first 5 hours acetylcholine and cholinesterase activity were undetectable. Cholinesterase activity appeared at 7 hours in the untreated eggs only and increased up to hatching time. Acetylcholine was detectable in both treated and untreated eggs at 9 hours and increased considerably in the eleventh hour. Considerably more acetylcholine was produced in the treated eggs. No cholinesterase activity was detectable in the treated eggs.

These findings seem to explain the delayed action of the phosphorus insecticides on insect eggs. Since acetylcholine is the toxic agent in anticholinesterases there will be no mortality before this substance is produced in the eggs. If at the time of hatching, when large quantities of acetylcholine are present, the insecticide inhibits the cholinesterase which controls the acetylcholine, death then occurs. *W. Z. Coker*

Gersdorff, W. A., Piquett, P. G. & Beroza, M. **The Intensity of Synergism of some Methylenedioxyphenyl Acetals with Pyrethrins or Allethrin in House Fly Sprays.** *J. Econom. Entom.* 1957, Aug., v. 50, No. 4, 406–9.

Gersdorff, W. A., Piquett, P. G. & Beroza, M. **Comparative Effects of the Optical Forms of Epiasarinin, Asarinin, and Sesamin in Pyrethrum Mixtures as House Fly Sprays.** *J. Econom. Entom.* 1957, Aug., v. 50, No. 4, 409–11.

World Health Organization. Technical Report Ser. No. 125. **Expert Committee on Insecticides. Seventh Report.** Geneva, 10–17 July 1956. 31 pp., 1 diagram. [Refs. in footnotes.] 1957. Geneva: Palais des Nations. [Sales agent for U.K., H.M. Stationery Office.] [1s. 9d.; $0.30; Sw.fr. 1.–.]

The report is largely concerned with the problem of resistance to insecticides, the definition of resistance adopted by the Expert Committee on Insecticides being as follows:

"Resistance to insecticides is the development of an ability in a strain

of insects to tolerate doses of toxicants which would prove *lethal* to the majority of individuals in a normal population of the same species. The term 'behaviouristic resistance' describes *the development of* the ability to avoid a dose which would prove *lethal*."

In the report, urgent emphasis is given to the need for more research on the resistance of insects to insecticides, particularly in fundamental aspects of the problem. This, it is recommended, should be integrated on an international scale between the laboratories suited by equipment and personnel to undertake particular fields of study. Finance must be found to support this work. The World Health Organization should give a lead in this direction, and collate and distribute data widely and speedily.

The Committee strongly recommends the standardization of tests for detecting resistance in all arthropods of public health importance and for bio-assay methods for determining toxicity levels of residual deposits. With the development of resistance in numerous groups of insects in the public health field, knowledge of control methods which might be good alternatives to those in force would be a valuable aid. It is recommended that the World Health Organization look into the question of preparing a comprehensive account of all vector control methods now commonly in use.

In brief comments on several insecticides note is made of the value of the organo-phosphorus group as a fresh means of attack against insects resistant to chlorinated hydrocarbons. Lack of residual action is a disadvantage in the organo-phosphorus compounds but they have their uses in baits for house-flies and deserve fuller study for larval and adult control of mosquitoes. The growing threat from resistance calls for renewed attention to vector reduction by environmental control—drainage, etc., for mosquitoes and waste disposal for the house-fly and its allies. Control by release of insects sterilized by irradiation is a new principle which must be kept in mind as having possible applications in public health problems.

The latter part of the report is concerned with disinsectization of aircraft, specification and testing of aerosol formulations and aerosol dispensers. The Committee's recommendation is that airports open to international traffic be as free as possible from disease-bearing insects within an area extending for 400 metres round the perimeter. Crew and passenger quarters, if outside this area, should be supervised. Disinsectization of internal compartments (and external recesses) of aircraft should be done before passengers enter the aeroplane, doors, etc. being closed for 5 minutes after the release of the aerosol. Aerosols, for which several formulae are given in the report, should be of pyrethrins and DDT at 35 gm. of the formulation per 100 cubic metres (10 gm. per 1,000 cubic feet). Disinsectization while in flight is considered by the Committee to be unsatisfactory and not acceptable in substitution for treatment before take-off.

D. S. Bertram

Gerolt, P. **Improved Persistence of Dieldrin Deposits on Sorptive Mud Surface.** [Correspondence.] *Nature.* 1957, Aug. 24, v. 180, 394–5.

A wettable powder of dieldrin was prepared by mixing equal amounts of powdered dieldrin and powdered coumarone resin, fusing this together to a homogeneous mixture, and finely grinding it to particle sizes of 10–50 μ. As was hoped, this preparation proved effective in limiting absorption of the dieldrin into experimental mud blocks of a highly absorptive Tanganyika soil.

24-hour mortalities of house-flies, exposed for 30 seconds' contact to a deposit of 12·5 mgm. dieldrin per sq. ft. of the dieldrin-coumarone resin formulation, were still 100% after 10 months. With standard 50% dieldrin wettable powder at 25 mgm. dieldrin per sq. ft., 24-hour mortality was 100% for 1 day and then fell progressively to 8% in 2 weeks' time. The proportions of dieldrin to coumarone resin could be varied widely (ratios 9:1 and 3:7) with equally effective results for 3 months. Coumarone resin combination with DDT, gamma BHC, and aldrin also gave improvement in persistance compared with their normal formulation. Various other resins, bitumens and pitches proved effective adjuvants besides the coumarone resin. The nature of the phenomenon is not yet fully understood, but work continues. *D. S. Bertram*

REPORTS AND SURVEYS

Passager, P. Ouargla (Sahara constantinois). Étude historique, géographique et médicale. [**Historical, Geographic and Medical Study of Ouargla, Algeria**] *Arch. Inst. Pasteur d'Algérie.* 1957, June, v. 35, No. 2, 99–200, 42 figs. on 20 pls. + 7 text figs. [45 refs.]

During the last 30 years most of the important localities of southern Algeria have been the subjects of general monographs, the medical aspects of which have from time to time been abstracted in this *Bulletin* [see, for example, this *Bulletin*, 1957, v. 54, 894, 896]. Ouargla is a desert region of 70,000 square miles, with one large oasis, Ouargla itself, and a few smaller ones. The whole district has a population of 32,239, of whom Ouargla town has 8,558, with a European settlement of over 800. The standard of living is low, dates being the chief food and date-growing the chief occupation, and the town has long had the reputation of being among the most sordid places in Algeria. Recently the local administration has improved it somewhat, but personal hygiene is still extremely poor, aggravated by general malnutrition.

Ouargla has, by decree, a staff of two military doctors. There are two hospitals, a civil one of 70 beds and a military one of 30 beds. Admissions totalled 1,054 in 1956, but out-patient attendances the high figure

of 169,639; about half the latter were children with trachoma. Outside Ouargla, dispensaries at the other oases are visited on a regular schedule, and a travelling dispensary visits smaller settlements and nomads. Maternity and child welfare is mostly done by the White Sisters mission. Ouargla used to be notorious for a high death rate almost throughout the year. Malaria was invariably epidemic in September. In 1948 the child indices of endemicity were spleen rate 24·8, average enlarged spleen 2 and parasite rate 21·7. Among troops *Plasmodium vivax*, among local schoolchildren *P. falciparum*, were the commoner parasites; *P. malariae* also occurred. *Anopheles multicolor* was found to be the only vector. After a campaign in 1949, antilarval, imagicidal and chemoprophylactic (with proguanil) the child spleen rate sank rapidly to 2·4%. Since then the control of irrigation ditches and chemoprophylaxis of children with chloroquine have been kept up; the child spleen rate in 1956 was 0·2%. It is stressed that, with immunity lost, a breakdown in larval control of the irrigation system would be extremely serious.

Ouargla suffered in the North African epidemics of typhus in 1944 and relapsing fever in 1946. Smallpox has not been reported since 1944. 5 cases of cerebrospinal meningitis were seen between 1949 and 1953. Tuberculosis, almost all pulmonary, is serious and on the increase. In 1919 36·5% of all ages reacted to a skin test; in 1953 55·8% were Mantoux positive. An antituberculosis campaign has been started, with modern drugs, collapse therapy and BCG vaccination. Pneumothorax, with its fortnightly out-patient inspection, is more popular than drug therapy which implies a prolonged stay in hospital. Ophthalmias, specially trachoma, are the commonest of all diseases and the subject of a specific campaign. Syphilis, gonorrhoea and soft sore are very common, though prostitutes are licensed and subject to regular medical inspection.

Much detail about other diseases, and a section on local medical practices, are given. *B. B. Waddy*

GRIFFITH, D. H. S. **A Short Social Study of a Group of Labourers in Malaya.** *Med. J. Malaya.* 1957, Mar., v. 11, No. 3, 209–23.

This paper records the results of an investigation of living standards in a group of 73 male and 23 female antimalarial labourers of whom over 90% were Indians, the rest being Malays. Houses were provided free in labour lines but were gloomy and overcrowded. Of 47 families with children 34 inhabited 1 room, 9 lived in 2 rooms and 4 in 3 rooms. Wages ranged from $51 to $133 per month. Over 70% of the men earned between $64 and $76 per month and only 4 or 5 earned more than $100 a month.

An investigation of income and expenditure in the different groups showed that married men supporting families of 1 or more children, and widowed labourers with 3 or more children, all had deficits. Diets

purchased were satisfactory on average, but in most groups wages were insufficient to feed the family and provide fuel and clothing; the labourer could support a wife or small family but not a wife and family. 73% of the children of married men were over 10 years of age but only 7% of these were working. Only one-third of the mothers were gainfully employed and some 70% of the labourers contributed in addition to the maintenance of persons other than wives and families. Since no overtime was worked it is believed that most labourers undertake additional work in their spare time in order to meet their varied commitments. This results in working some 10 hours or so daily for 6 days of the week, causes inefficiency and is likely to lead to industrial unrest.

T. H. Davey

BOOK REVIEWS

CAMERON, Thomas W. M. **Parasites and Parasitism.** pp. xix + 322. 115 figs. 1956. London: Methuen & Co. Ltd. New York: John Wiley & Sons, Inc. [35s.]

The approach of most medical and veterinary practitioners to parasitology is through the traditional attitude of pragmatic concern with the host and with the alterations produced in it by the parasite; this attitude is, in the case of medicine, further conditioned by the selection of pathogens largely restricted to bacteria or viruses, causing diseases which in temperate climates are transmitted without the agency of vectors. The approach of the zoologist is usually through an academic interest in a restricted number of type organisms with diverse life cycles, an interest in which the clinical and economic significance of infection is not so important. Until a sufficiently detailed knowledge of parasitism has been acquired concerning organisms living in many different hosts in widely different environments, it is difficult to appreciate fully the underlying general principles. The author states in his preface "No organism is an entity unto itself; it lives as a member of the community and the life processes both of itself and of its neighbours act and interact on each other".

This book is concerned with the general biological principles of parasitism, rather than the details. It provides an integrated concept showing how organisms can adapt themselves to each other; it suggests how this association evolves, describing the interplay of taxonomic variation and environmental opportunity and association. Comparative parasitology is discussed in general terms involving morphology, biochemistry and behaviour. Separate chapters are devoted to the bacteria, the fungi, the spirochaetes, the protozoa, the viruses, the rickettsiae, the coelenterates,

the helminths, the annelids, the arthropods, the molluscs and the vertebrates, and the host and its reactions are considered in the chapters on parasitism, infectious disease, the factors involved in the distribution of parasites, the principles of control of parasites and parasitic diseases, and the host specificity and evolution of parasites. It is the purpose of this review to indicate the general scope of the work, rather than to discuss the details; nevertheless, it should be remarked that the correlation of the environment and the biochemistry of the parasites is particularly stimulating.

While the author claims that no previous knowledge of parasitology is required, the significance of the work is considerably enhanced by detailed familiarity with any large group of parasites, and while it may therefore be very valuable to a zoologist in his final year, or on his embarking on a post-graduate career in parasitology, it gives to the experienced parasitologist with specialized knowledge a wide conspectus of provocative comparison. Parasites of man and of his domestic animals are considered more closely only because they have received much more intensive study than other parasites; this book is not an alternative to standard text-books on parasitology written for medical men or veterinary surgeons. It is a book which should be read by anyone wishing to study parasitology for its own sake. *W. E. Kershaw*

Wigglesworth, V. B. [C.B.E., M.D., F.R.S.] **Insect Physiology.** 5th Edition, revised & reset. pp. x + 130, 12 figs. 1956. New York: John Wiley & Sons, Inc. London: Methuen & Co., Ltd. [8s. 6d.]

Medicine and hygiene, like other applied sciences, can often be aided by a wide variety of other fields of knowledge. Insect physiology seems fairly remote from the control of tropical diseases until one remembers that so many are insect-borne and that their epidemiology and control depend largely on a detailed knowledge of the biology of the insect vector.

This is a new edition of Wigglesworth's pocket guide to insect physiology [this *Bulletin*, 1951, v. 48, 1058] which will help the medical entomologist who likes to be well informed on the fundamental processes of the creatures he is planning to destroy. Much of this book follows the lines of the earlier editions, though numerous small changes are evidence of careful revision. In particular there are new sections on diapause and additional data on metamorphosis. This is to be expected, since these two subjects have recently been the subjects of monographs by A. D. Lees, an associate of Wigglesworth, and by the author himself. The brief section on reproduction has been expanded to a new chapter and there is also a new short chapter on muscles and movement. By increased length of lines and a few extra pages, the length has been increased by about 30%. *J. R. Busvine*

British Medical Association. Pharmaceutical Society of Great Britain. **British National Formulary 1957. Alternative Edition based on a Pharmacological Classification.** 245 pp. 1957. London, W.C.1.: B.M.A., Tavistock Square, & Pharmaceutical Press, 17, Bloomsbury Square. [7s. 6d.; 10s. 6d. (interleaved).]

Not long ago publishers often described any new but mediocre text-book as "filling a long-felt want". How unfortunate that the phrase should have become so debased, for here at last is a book which well merits the description. And it is certainly not mediocre.

The *British National Formulary*, in size no larger than a big pocket diary, contains a mass of information for the prescriber. It is divided into a number of sections, of which 3, the pharmacological classification, the classified formulary, and the treatment of poisoning, are the most important. Not that the ancillary sections are to be ignored. Indeed they provide snippets of information which might be difficult to discover in other works of reference, as for instance the labelling and identification colours for gas cylinders, the vehicles used for dermatological preparations, and the quantities needed for local application to various parts of the body. The list, too, of proprietary preparations and their official equivalents is very practical, even though it is likely to become dated in a short time.

Unlike the standard edition, this alternative edition presents the drugs according to their therapeutic effect, not according to their pharmaceutical class. The main emphasis is, of course, on drugs which meet the requirements of the patient in temperate climates, but the needs of those in the tropics are not overlooked. Antiamoebics, antileprotics, antimalarials, trypanocides, leishmanicides, schistosomicides, and filaricides are all discussed; in fact, the compilers seem to have some difficulty in deciding whether the last two should come under the pharmacological classification of anthelmintics or of drugs acting on infections, and have therefore placed them in both classes.

There is a refreshing absence of dogmatism in the classified formulary, the drugs being assessed on their therapeutic value, and not, as might have been expected in a country where doctors are constantly urged to count the cost, on whether they are proprietary. Nevertheless there is evidence that the compilers realize that cost is an important factor. In discussing cough suppression, they point out that codeine is the simplest and safest drug, but are still fair enough to offer a passing reference to pholcodine.

There are blemishes, one at least being serious. To say that nalorphine is a specific antidote to morphine in animals but its value in man is uncertain, is an implied warning against a drug which can be life-saving. The *British Pharmaceutical Codex* does not share the doubts expressed in the *British National Formulary*, nor for that matter does it classify nalorphine as a respiratory stimulant; it is so only in small doses, but

large amounts cause death through respiratory failure. Lesser faults are to be found, but they are unimportant. One might point to the misspelling of benzhexol on page 19, or the omission of chlorcyclizine from the list of antiallergics on page 24. Again, one might take issue with the compilers on the statement that chloroquine salts and amodiaquine hydrochloride are the most powerful suppressants of malaria. If by powerful is meant the most potent weight for weight then the claim is unwarranted.

Some of the difficulties of the compilers in keeping the book compact are to be found in the index. In consulting it, the reader should remember that brevity is the essence of the work. So he should not be surprised to find, say, no mention of malaria in the index, but should turn to the word "antimalarials". Similar examples could be mentioned.

One surprising feature of this book is the contrast it offers to the standard edition. The latter, in its Notes for Prescribers, offers some extraordinary advice on the treatment of ascariasis, the three principal remedies suggested being santonin, tetrachlorethylene and hexylresorcinol. Piperazine is given scant mention. Such antiquated, even dangerous, advice has been revised in the alternative edition, and one wonders whether the same writer could possibly have been responsible for both monographs.

The one regrettable feature is that this edition is not being issued to all prescribers, but has to be asked for. It would be far better if the standard edition were to be reserved for dispensing pharmacists, and the alternative edition sent to practitioners.

In view of the vast number of new drugs which research is daily placing in the hands of the medical profession, it would seem advisable to produce revised editions of this formulary at least once a year.

W. A. Littlejohns

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(The bracketed abbreviations after the page numbers indicate the subjects. Page numbers within brackets indicate papers not summarized.)

Am.	signifies	Amoebiasis and Intestinal Protozoal Infections.
Bart.	„	Bartonellosis.
Bl.	„	Blackwater Fever.
B.R.	„	Book Review.
Chl.	„	Cholera.
Def. Dis.	„	Deficiency Diseases.
Den.	„	Dengue and Allied Fevers.
Der.	„	Dermatology and Fungus Diseases.
Ent.	„	General Entomology and Insecticides: General Zoology.
Ep. Dropsy	„	Epidemic Dropsy.
Haem.	„	Haematology.
Heat Str.	„	Heat Stroke and Allied Conditions.
Hel.	„	Helminthiasis.
Lab..	„	Laboratory Procedures.
Leish.	„	Leishmaniasis.
Lep.	signifies	Leprosy.
Mal.	„	Malaria.
Misc. Dis.	„	Miscellaneous Diseases.
Misc. Pap.	„	Miscellaneous Papers.
Oph.	„	Tropical Ophthalmology.
Parasit.	„	Parasitology: General.
Pl.	„	Plague.
Rab.	„	Rabies.
R.F.	„	Relapsing Fever and other Spirochaetoses.
Reports, etc.	„	Reports and Surveys.
Sp.	„	Sprue.
Tox.	„	Toxoplasmosis.
Tryp.	„	Trypanosomiasis.
Typh.	„	Fevers of the Typhus Group.
Ulc.	„	Tropical Ulcer.
Vms.	„	Venoms and Antivenenes.
Y.F.	„	Yellow Fever.
Ys.	„	Yaws.

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Badr El-Din, M. K. & Aboul Wafa, M. H., 1224 (Def. Dis.)
Baer, J. G., 184 (Hel.)
Baernstein, H. D., Rees, C. W. & Bartgis, I. L., 1412 (Am.)
Bahamonde, L. (joint author), 1234 (Vms.)
Baigulova, S. A. (joint author), 1290 (Mal.)
Bailenger, J., 1106 (Hel.)
Bailey, W. S. (joint author), 44 (Am.)
Bain, A. D., Bowie, J. H., Flint, W. F., Beverley, J. K. A. & Beattie, C. P., 607 (Tox.)
Baker, E. E. (joint author), 40, 288 (Am.)
Baker, J. R., 797 (Tryp.), 1294 (Mal.)
Ba-Khuyen, N. (joint author), 832 (Lep.)
Bakker, A. W. I., Bliek, A. & Luyken, R., 991 (Def. Dis.)
Balanovschi, G. (joint author), 529 (Mal.)
Balasubrahmanyan, M. (joint author), (1246) (Misc. Dis.)
Baldomir, J. M. (joint author), 1439 (Hel.)
Balducci, D. & Tyrrell, D., 217 (Tox.)
Balikian, G. (joint author), 494 (Parasit.)
Ball, G. H. (joint author), 795 (Mal.)
Balmès, A. & Thévenet, A., (321) (Hel.)
—— & Vincent, P., (321) (Hel.)
Balozet, L., 606 (Vms.)
Baltazard, M., 162 (Rab.)
—— & Eftekhari, M., 1076 (Pl.)
Bambridge, B. (joint author), 850 (Hel.)
Bami, H. L., (768) (Ent.)
Bandin, A. I., (926) (Mal.)
Banerjee, B. N. (joint author), 19 (Leish.)
Banerjee, G., Roy, D. K. & Ganguli, N. C., 409 (Leish.), 424 (Chl.)
—— (joint author), 19 (Leish.)
Banerjee, S., Bhaduri, J. N. & Sarkar, A. K., 1189 (Chl.)
—— & Ghosh, H., 953 (Chl.)
Banerji, D., 93 (Misc. Dis.)
Banerji, R., 428 (Chl.)
Banfield, A. W. F., 279 (Typh.)
Baptista, A. M. (joint author), 976 (Hel.)
Barbançon, S. (joint author), 894 (Reports, etc.)
Barbareschi, G. (joint author), 1006 (Tox.)
Barbosa, F. S. & Coelho, M. V., 974, 1327 (Hel.)
—— (joint author), 974, 975 (Hel.)
Barbosa, J. C. L., 1346 (Def. Dis.)
Barker, R. J., 1372 (Ent.)
—— & Rawhy, A., 764 (Ent.)
Barlow, F. & Hadaway, A. B., 632 (Ent.)
—— (joint author), 534 (Mal.)
Barme, M., 1067 (Typh.)
Barnes, H. D., Frootko, J. & Parnell, J. L., (1007) (Der.)
Barnicot, N. A. (joint author), 1230 (Haem.)
Barnola, J., 898 (B.R.)
Barr, A. R., 1136 (Ent.)
Barretto, M. P., (1373) (Ent.)
Barten, J. J. C., 91 (Misc. Dis.)
Bartgis, I. L. (joint author), 1412 (Am.)
Barth, R., (1064) (Tryp.)
Bartl, Z. (joint author), (63) (Hel.)
Baskind, E. (joint author), 746 (Haem.)
Basnuevo, J. G., 1105 (Hel.)
Bassir, O., 200 (Def. Dis.)
Basson, H. (joint author), 862 (Def. Dis.)
Basu, P. C. & Ray, A. P., 260 (Mal.)
—— (joint author), 131, 391 (Mal.) (271), (Tryp).
Basu, S. N., 568 (Chl.)
—— (joint author), 817 (Chl.)
Batten, P. J., Jr., 1332 (Hel.)
Baumann, H. (joint author), 758 (Parasit.)
Bearup, A. J., 182, 1332 (Hel.)
Beattie, C. P., 1121 (Tox.)
—— (joint author), 607 (Tox.)
Beaver, P. C., 64, 722 (Hel.)
——, Jung, R. C., Sherman, H. J., Read, T. R. & Robinson, T. A., 685, 686 (Am.)
Bechelli, L. M., De Souza, P. R. & Quagliato, R., 1194 (Lep.)
—— & Rotberg, A., 438 (Lep.)
——, Souza, R. de P., Quagliato, R. & Ferraz, N. de T., 446 (Lep.)
—— (joint author), 446 (Lep.)
Becker, E. R., Hollander, W. F. & Pattillo, W. H., (267) (Bl.)
Becker, H. & Lieske, H., 948 (Y.F.)
Beeckmans, G., 1212 (Hel.)
—— (joint author), 481 (Der.)
Beesley, W. N. (joint author), 466 (Hel.)
Beet, E. A., 616, 755 (Misc. Dis.)
Begg, A. C. (joint author), 1334 (Hel.)
Begg, N. C., Begg, A. C. & Robinson, R. G., 1334 (Hel.)
Béhar, M. (joint author), 202, 861, 863, 1224 (Def. Dis.)
Beirne, B. P., (361) (Ent.)
Bektemirov, T. A., Tarasevich, I. V. & Karulin, B. E., 553 (Typh.)
—— (joint author), 555 (Typh.)
Belios, G. D. & Fameliaris, G., 919 (Mal.)
Bell, J. F., Burgdorfer, W. & Moore, G. J., 1179 (Rab.)
——, Hadlow, W. J. & Jellison, W. L., 676 (Rab.)
Bellamy, R. E. (joint author), 1249 (Ent.)
Bellelli, L. & Pirlo, F., 402, (1061) (Tryp.)
Bellu, C. (joint author), 179 (Hel.)
Ben-Ari, J., 967 (Hel.)
Benedek, T., 484 (Der.)
Benelli, C. (joint author), (819) (Am.)
Benetti, M. P. (joint author), 1251 (Ent.)
Bénex, J. (joint author), 65, 186, 1442 (Hel.)
Benjamini, E. (joint author), 1252 (Ent.)
Benoist, F., Giroud, P., Héraud, G. & Lelièvre, A., (802) *bis*, (803) (Typh.)
Bent, D. F., Rosen, H., Levenson, S. M., Lindberg, R. B. & Ajl, S. J., 1076 (Pl.)
Beran, V., Přívora, M. & Samšiňák, K., (1373) (Ent.)
Bérard-Badier (joint author), 140 (Tryp.)
Berdonneau, R. & Garcin, D., (837) (Hel.)
—— (joint author), 267 (Mal.)
Bergel, M., (51) (Lep.)
Bergeret, B., 598 (Def. Dis.)
Bergmann, E. D. (joint author), 628 (Ent.)
Berkovici, B. (joint author), 866 (Haem.)
Berman, R. J. (joint author), 222, 351 (Der.)
Bernard, P. M., 778 (Mal.)
Berning, H., 1397 (Tryp.)
Bernkopf, H. (joint author), 615 (Oph.)
Beroza, M. (joint author), 887, (1477) *bis* (Ent.)
Berry, D. M. (joint author), 1246 (Misc. Dis.)
Berry, J. W. (joint author), 90 (Heat Str.)
Berti, F. (joint author), 54 (Lep.)
Bertram, D. S., 767 (Ent.)
—— & McGregor, I. A., 527 (Mal.)
Bertrand, J. L. & Faure, H., 457 (Hel.)

Berzina, A. N., 231 (Parasit.)
Béthoux, L. & Merle, M., (719) (Hel.)
Bétoulières, P. (joint author), (85) (Tox.)
Bettini, S. & Calcara, S., (215) (Vms.)
——, Natalizi, G. & Boccacci, M., (242) (Ent.)
—— (joint author), 1022 (Ent.)
Betts, G. D. (joint author), (405) (Tryp.)
Beuchat, A. (joint author), 969 (Hel.)
Beverley, J. K. A., 620 (Parasit.), 1005, 1121 (Tox.)
—— & Fry, B. A., 1239 *bis* (Tox.)
—— (joint author), 607 (Tox.)
Beye, H. K., Mille, R., Thooris, G. & Tapu, J., 67 (Hel.)
Bezon, A., 531 (Mal.)
Bhaduri, J. N. (joint author), 1189 (Chl.)
Bhagat, M. P. (joint author), 77 (Def. Dis.)
Bhagavan, N. V., Nimbkar, Y. S. & Rao, S. S., 814 (Pl.)
Bhaskar, G. R. (joint author), 588 (Hel.)
Bhaskaran, K., 1314 (Chl.)
—— & Gorrill, R. H., 1315 (Chl.)
—— & Rowley, D., 33 (Chl.)
Bhatia, M. L. & Krishnan, K. S., 1047 (Mal.)
——, Satya Prakash & Ramakrishnan, S. P., 1152 (Mal.)
——, Wattal, B. L. & Kalra, N. L., (1135) (Ent.)
——, —— & Mammen, M. L., 1287 (Mal.)
—— (joint author), 42 (Am.), 1070 (Y.F.)
Bhattacharyya, M. N., 17 (Leish.)
Bhombore, S. R., Sitaraman, N. L. & Achuthan, C., 533 (Mal.)
Bhowmik, D. N. (joint author), 497 (Parasit.)
Biagi F., F., 465 (Hel.), 660 (Tryp.)
—— & Alemañy, J., 1003 (Tox.)
—— & Portilla, J., 848 (Hel.)
Biancalana, A. (joint author), 146 (Tryp.)
Bianco, I. (joint author), (605), 1117, 1228 (Haem.)
Bibawi, E. (joint author), 1099 (Hel.)
Bica, A. N. & Román, J., (1419) (Ys.)
——, —— & Sáenz, A. C., 1192 (Lep.)
Bichovsky, A., 954 (Am.)
Bickerstaff, E. R., 593 (Hel.)
Bidlingmayer, W. L. & Schoof, H. F., 502 (Ent.)
Biguet, J. (joint author), 330, 735 (Hel.)
Bijan, H. (joint author), 709 (Hel.)
Binford, C. H., 297 (Lep.)
Binson, G. & Doucet, J., 261, 1287 (Mal.)
Biocca, E., 760 (Ent.)
Bird, A. F., (1337) (Hel.)
Bird, G. W. G. & Lehmann, H., 1000 (Haem.)
Bird, R. M. (joint author), 1000 (Haem.)
Bird, T. & Thomson, J., 882 (Parasit.)
Bîrzu, I. (joint author), 148 (Leish.)
Black, H. (joint author), 39 (Am.)
Blagoveshchenskiĭ, D. I., 231 (Parasit.)
Blair, D. M., 584 (Hel.)
Blakeslee, T. E. (joint author), 239, (500) (Ent.)
Blanc, F., (393) (Mal.)
Blanc, G., 422 (Pl.), (478) (Tox.)
—— & Bruneau, J., 155, 556 (Typh.)
Blanc, M., 76 (Hel.)
—— & d'Aubenton, F., 1342 (Hel.)
Blaškovič, D., 1266 (Reports, etc.)
Blass, J., (287) (Chl.)
Blenska, W. (joint author), 1420 (Lep.)
Bliek, A. (joint author), 991 (Def. Dis.)
Blum Gutiérrez, E., 699 (Lep.)
—— (joint author), 298 (Lep.)
Boase, A. J., 322 (Hel.)
Boccacci, M. & Bettini, S., 1022 (Ent.)
—— (joint author), (242) (Ent.)
Bockman, A. A. (joint author), 1345 (Hel.)
Bodenstein, O. F. (joint author), 887 (Ent.)
Boenjamin, R., (444) (Lep.)
Bogliolo, L., 977 (Hel.)
Bohart, R. M., 1135 (Ent.)
Bohidar, R. C., 1450 (Def. Dis.)
Boiron, H., 1175 (Y.F.)
Bois, P. (joint author), 619 (Misc. Dis.)
Boivin, P., (867) (Haem.)
Bokman, A. H., Levine, H. B. & Lusby, M., (1134) (Misc. Dis.)
Bol. Oficina Sanitaria Panamericana, (1419) (Ys.)
Bonaduce, A. & Andrini, F., 1355, 1356 (Tox.)
Bonnefoy, J. (joint author), 1234 (Vms.)
Bonnet, D. D. & Chapman, H., 728 (Hel.)
——, Kessel, J. F., Kerrest, J. & Chapman, H., 728 (Hel.)
Bonne-Wepster, J., 463 (Hel.)
Boone, H. A. (joint author), 1413 (Am.)
Bordenave, J. F. & Bouvet, G., (615) (Oph.)
Bordjochki, A. (joint author), 219, 876, 1238 (Tox.)
Borjanović, S. (joint author), 766 (Ent.)
Bose, D. N., 579 (Lep.)
Boshell, M., J., 1172 (Y.F.)
Bottimer, L. J. (joint author), (502) (Ent.)
Bouchat, J., 896 (Reports, etc.)
Bouisset, L., Harant, H. & Ruffié, J., 404, 546 *bis* (Tryp.)
Boulan, S. (joint author), 935 (Tryp.)
Bourdet, M. (joint author), 1471 (Misc. Dis.)
Bouvet & Ahecoro, (87) (Oph.)
Bouvet, G. (joint author), (615) (Oph.)
Bovarnick, M. R. & Allen, E. G., 940 (Typh.)
Bowie, J. H. (joint author), 607 (Tox.)
Boyland, E., 620 (Parasit.)
Bozeman, F. M. (joint author), 804 (Typh.)
Božič, C. (joint author), 95 (Parasit.)
Braaksma, H. E., 766 (Ent.)
Bradbury, F. R., 767 (Ent.)
—— & Standen, H., 266 (Mal.)
Brahmanandam, S. (joint author), 474 (Haem.)
Brajović, R. (joint author), 170 (Am.)
Brakel, J. (joint author), 1338 (Hel.)
Brandon, M. L., Jones, H. L. & Warden, H. D., (1082) (Am.)
Brangier, J. (joint author), (475) (Haem.)
Bras, G., Berry, D. M. & György, P., 1246 (Misc. Dis.)
——, Waterlow, J. C. & DePass, E., 468 (Def. Dis.)
—— (joint author), 77, 862, 1222 (Def. Dis.)
Brauns, A. (joint author), 1023 (Ent.)
Brauns, W. (joint author), 682 (Am.)
Bravo Oliva, J. (joint author), (1134) (Parasit.)
Bray, R. S., 653 (Mal.)
Brázdová, K. & Aldová-Klečková, E., 1473 (Parasit.)
Breev, K. A., 231 (Parasit.)
—— & Karazeeva, Z. F., 231 (Parasit.)
Bregetova, N. G., 231 (Parasit.)
—— & Kolpakova, S. A., 231 (Parasit.)
Brener, Z. (joint author), 715 (Hel.), 1300 (Tryp.)
Breteau, G. (joint author), 1216 (Hel.)
Brezina, R., 281 (Typh.)
—— & Táborská, D., 674 (Typh.)
Briceño Rossi, A. L., 949 (Rab.)

Bridges, P. M., (1138) (Ent.)
Briggs, G. W. (joint author), 121 (Mal.)
British Encyclopaedia of Medical Practice, 1270 (B.R.)
British Medical Association, 1483 (B.R.)
Brock, J. F. (joint author), 334 (Def. Dis.)
Brockett, J. E., Jr., Crowley, L. V. & Pollack, H., 191 (Def. Dis.)
—— (joint author), 191 (Def. Dis.)
Brooke, M. M. (joint author), 39 (Am.), 1115 (Hel.)
Brooks, R. F. (joint author), 885 (Ent.)
Brown, A. L. (joint author), 31 (Rab.)
Brown, A. W. A., 97, (1020) (Ent.)
—— (joint author), 943 (Typh.)
Brown, H. W., 66 (Hel.)
—— (joint author), 1110 (Hel.)
Brown, J. A. K., 52, 1420 *bis* (Lep.)
——, Short, G. M. & Blenska, W., 1420 (Lep.)
Brown, R. D., 415 (Typh.)
Brown, W. B., 1025 (Ent.)
Browne, S. G., 441 (Lep.)
Bruce-Chwatt, L. J., 533, 778, 919, 1381 (Mal.)
—— & Charles, L. J., 1153 (Mal.)
—— & Gibson, F. D., 1289 (Mal.)
—— & Haworth, J., 123 (Mal.)
—— & Service, M. W., 920 (Mal.)
—— (joint author), 119, 780 (Mal.)
Bruch T., H. A. (joint author), 1221 (Def. Dis.)
Brueckner, A. L. (joint author), 282 (Den.), 813 (Mal.)
Bruijning, C. F. A., 1111, 1215 (Hel.)
Bruneau, J. (joint author), 155, 556 (Typh.)
Bruni Celli, B., 898 (B.R.)
Bruton, O. C. & Jaffurs, W. J., 1339 (Hel.)
Bryan, J. (joint author), 1400 (Typh.)
Brygoo, E. R., 165 (Pl.), 1014 (Misc. Dis.)
—— & Courdurier, J., 424 (Pl.)
—— & Dodin, A., 420, 677 (Rab.)
—— (joint author), 677 (Rab.)
Bucalossi, A. (joint author), 108 (B.R.)
Buckley, E. E. & Porges, N., 898 (B.R.)
Buddecke, E., Essellier, A. F. & Marti, H. R., 41 (Am.)
Budden, F. H., 74 (Hel.), 1007 (Oph.)
Budurin, A. A. (joint author), 354 (Der.)
Bueding, E. & Mansour, J. M., (1100) (Hel.)
Bueno de Mesquita, S. J. (joint author), 1423 (Lep.)
Bulgarelli, R. & Maranzana, A., 16 (Leish.)
Bull. World Health Organization, 778, 918 (Mal.)
Bulling, E., 420 (Rab.)
Bumbalo, T. S. & Gustina, F. J., 76 (Hel.)
Buonomini, G., Ricciardi, M. L. & Carli, G., 967 (Hel.)
Burden, G. S. & Cole, M. M., 363 (Ent.)
—— (joint author), 411 (Typh.)
Burgdörfer, F., 1380 (B.R.)
Burgdorfer, W. (joint author), 1179 (Rab.)
Burkitt, R., 1460 (Vms.)
Burks, J. W., Jr. & Kingery, F. A. J., 461 (Hel.)
Burnett, G. F., 1294 (Tryp.)
——, Robinson, J. & Le Roux, J. G., 1296 (Tryp.)
—— & Thompson, B. W., 243 (Ent.)
Burns, K. F., Farinacci, C. F., Murnane, T. G. & Shelton, D. F., 29 (Rab.)
Burrows, R. B., 1316 (Am.)
Burrows, T. W. & Bacon, G. A., 283 (Pl.)
—— (joint author), 565, 566 (Pl.)
Burrows, W. (joint author), 426 (Chl.)
Bursell, E., 930, 1393 (Tryp.)
—— & Jackson, C. H. N., (930) (Tryp.)
Busson, F., Perisse, J., Rolland, M. & Meal, H., (1222) (Def. Dis.)
——, Toury, J., Guth, P. & Rolland, M., (1222) (Def. Dis.)
Busvine, J. R., 505, 767 *bis*, 885, (1022), 1024 (Ent.), 919 (Mal.)
Butler, G. C., Duggan, A. J. & Hutchinson, M. P., 540 (Tryp.)
Butterworth, C. E., Jr. & Perez-Santiago, E., 205 (Sp.)
Buttle, G. A. H., 620 (Parasit.)
Buttner, A., 1100 (Hel.)
Buu-Hoï, N. P., Ba-Khuyen, N. & Dat-Xuong, N., 832 (Lep.)
Byers, G. W., Wheeler, C. M. & Blakeslee, T. E., 239 (Ent.)
Bykhovskaya-Pavlovskaya, I. E., 231 (Parasit.)

C

Cabannes, R., (486) (Misc. Dis.)
Cabral, A. S., (234) (Parasit.)
Calcara, S. (joint author), (215) (Vms.)
Caldwell, A. G. & Standen, O. D., 313 (Hel.)
Calero M., C. (joint author), 279 (Typh.)
Calvó Fonseca, R., 496 (Parasit.)
Cambournac, F. J. C., Gândara, A. F. & Casaca, V. M. R., (266) (Mal.)
Cameron, I. G., 289 (Am.)
Cameron, J. (joint author), 718 (Hel.)
Cameron, T. W. M., 1481 (B.R.)
Campbell, J. A. H., 199 (Def. Dis.)
—— (joint author), 865 (Def. Dis.)
Campillo Sáinz, C. & Málaga, A., (1073) (Rab.)
—— (joint author), 1177 (Rab.)
Campos, N. S., 704 (Lep.)
——, Rosemberg, J. & Aun, J. N., 50, 698 (Lep.)
Canabal, E. J., Dighiero, J., Aguirre, C. V., Baldomir, J. M., Purcallas, J., Suzacq, C. V., Horjales, J. O., Hazán, J. & Scremini Algorta, P., 1439 (Hel.)
Canalis, A., de Negri, U., Frizzi, G. & Sepulcri, P., 5 *bis* (Mal.)
Candia, C. E., 897 (B.R.)
—— & Louis, C. E., 898 (B.R.)
Canham, P. A. S. (joint author), 1364 (Misc. Dis.)
Canning, E. U., (1287) (Mal.)
Cantrell, W. & Betts, G. D., (405) (Tryp.)
Capocaccia, L., 428 *bis* (Am.)
Caporali, J. (joint author), 535 (Mal.)
Capp, A. B. (joint author), 1090, 1091 (Lep.)
Caprari, P. (joint author), 1052 (Mal.)
Capron, A. (joint author), 330, 735 (Hel.)
Caputo, C., 1170 (Typh.)
Carayon, A., 1129 (Ulc.)
—— & Cornet, L., 1128 (Ulc.)
——, Hervé, A., Gaillard, F. & Coyne, F., 290 (Am.)
Carbonell, E., 898 (B.R.)
Carcassi, U. & Agnisetta, S., 1470 (Misc. Dis.)
——, Lenzerini, L. & Contu, L., 1470 (Misc. Dis.)
Cardoso, R. A. de A., Guimarães, F. N. & Garcia, A. P., 1462 (Tox.)
Carli, G. (joint author), 967 (Hel.)
Carlin, C. E. (joint author), 952 (Pl.)

Carmichael, J., 476 (Tox.)
Carneiro, J. F., (462) (Hel.)
Carneiro, M. N. R. (joint author), 1299 (Tryp.)
Caro, M. R., Derbes, V. J. & Jung, R., 1002 (Vms.)
Carol, L. G. (joint author), 411 (Typh.)
Carpenter, G. (joint author), 1230 (Haem.)
Carr, W. R. & Gelfand, M., 1223 (Def. Dis.)
—— (joint author), 744 (Def. Dis.)
Carreño, M. P. & Diez, A., 898 (B.R.)
Carrescia, P. M. & Arcoleo, G., 397 (Mal.)
Carruthers, H. L. (joint author), 683 (Am.)
Carter, F. R. N. (joint author), 39 (Am.)
Carvalho, R. P. S. (joint author), 703 (Lep.)
Carvao Gomes, F. A. (joint author), 1327 (Hel.)
Casaca, V. M. R. (joint author), (266) (Mal.)
Casanueva, M. (joint author), (1106) (Hel.)
Cashell, I. G. (joint author), 1065 (Leish.)
Castay, M. (joint author), 872 (Haem.)
Castel, P. (joint author), 301 (Hel.)
Castellani, A., 1127, (1130) (Ulc.)
Catella, F. (joint author), 240 (Ent.)
Cathie, I. A. B., 1121 (Tox.)
—— & Cecil, G. W., 1238 (Tox.)
Catzel, P. & Basson, H., 862 (Def. Dis.)
Causse, G. (joint author), 760 (Ent.)
Cauvin, L., Tasque, P. & Languillon, J., 670, (1069) (Typh.).
Cavalcante, J. D. N. (joint author), 1302 (Leish.)
Cavanaugh, D. C. (joint author), 285 (Pl.)
Cavanaugh, D. J. (joint author), 218 (Tox.)
Cavier, R., 581 (Hel.)
—— & Debelmas, A. M., 582 (Hel.)
Cawley, E. P. & Wheeler, C. E., 805 (Typh.)
Ceccaldi, J., Lepissier, H. & Merveille, P., 1184 (Rab.)
—— (joint author), 539 (Tryp.)
Cecil, G. W. (joint author), 1238 (Tox.)
Cellerino, N. A. (joint author), 44 (Am.)
Cellerino, R. J. (joint author), 44 (Am.)
Čermelj, V. (joint author), 95 (Parasit.)
Chaffee, E. F., Fife, E. H., Jr. & Kent, J. F., 548 (Tryp.)
Chaia, G., 1328 (Hel.)
Chakrabarti, A. K. & Singh, N. N., 1054 (Mal.)
Chakravarty, N. K. (joint author), 274 (Leish.)
Chalupský, J., 1344 (Hel.)
Chambon, L. & Destombes, P., 176 (Lep.)
—— & Fournier, J., 92 *bis* (Misc. Dis.)
——, Staub, A. M. & Bourdet, M., 1471 (Misc. Dis.)
Chandler, A. C., 1220 (Def. Dis.)
—— & Pradatsundarasar, A., 1109 (Hel.)
—— (joint author), 1164 (Tryp.)
Chandler, A. H. (joint author), 215 (Tox.)
Chandler, R. L., 659 (Tryp.)
Chang, S. L. & Kabler, P. W., 288 (Am.)
Chang, T. L. & Huang, T. C., 6 (Mal.)
Chang, Y. T., 297, 836 (Lep.)
Chaplin, H., Jr., Keitel, H. G. & Peterson, R. E., 80 (Haem.)
Chapman, H. (joint author), 728 *bis* (Hel.)
Charamis, J. & Tacticos, G., (615) (Oph.)
Charles, L. J. (joint author), 1153 (Mal.)
Charles, P. (joint author), 867 (Haem.), 1452 (Def. Dis.)
Charmot, G., 684 (Am.)
Charters, A. D., 1133 (Misc. Dis.), 1144 (Reports, etc.)
Chatigny, M. (joint author), 815 (Pl.)
Chatterjee, H. N., 568, 817, 1315, 1411 (Chl.)
Chatterjee, K. R. & Poddar, R. K., 176, 702 (Lep.)
Chatterjee, M. K. (joint author), 85 (Der.)
Chatterjee, S. N., 18 (Leish.), (53) (Lep.)
Chaudhuri, R. N., 489, 1130 (Misc. Dis.)
Chaudhuri, S. N. (joint author), 497 (Parasit.)
Chaussinand, R., 830 (Lep.)
Chávez, R. (joint author), 199 (Def. Dis.)
Chebat, J. (joint author), (431) (Am.)
Chebotarev, R. S., 979 (Hel.)
Chechelnitskaya, S. M. & Baigulova, S. A., 1290 (Mal.)
Chedecal, M. (joint author), 623 (Parasit.)
Chelarescu, M. (joint author), 529 (Mal.)
Chemke S., J. (joint author), 1063 (Tryp.)
Ch'en, C. T. & Liang, K. C., 650 (Mal.)
Ch'en, H. C. (joint author), (1014) (Misc. Dis.)
Chen, H. H., (1248) (Ent.)
——, Lien, J. C. & Tseng, P. T., 1373 (Ent.)
—— (joint author), 1288 *bis* (Mal.)
Ch'en, H. J. (joint author), 63 (Hel.)
Chen, T. H. (joint author), 677 (Pl.)
Cheng, N. K. & Ch'ien, P. C., 1104 (Hel.)
Cheptea, A. (joint author), 163 (Rab.)
Chernin, E. & Michelson, E. H., 1204 *bis* (Hel.)
—— & Weller, T. H., 1236 (Tox.)
Chernoff, A. I., 212 (Haem.)
Chesterman, C. C., 106 (Reports, etc.)
Cheung, M. W. (joint author), (1117) (Haem.)
Chevrier, L. (joint author), 1073 (Rab.)
Ch'i, W. L. (joint author), 587, 1105 (Hel.)
Chiang, S. C. (joint author), 716, 1329 (Hel.)
Chiari, I. (joint author), 630 (Ent.)
Chibalitch, D. (joint author), 432 (Am.)
Ch'ien, P. C. (joint author), 1104 (Hel.)
Chih, C. C. (joint author), 455 *bis*, 456 (Hel.)
Ch'in, W. C. & Ch'en, H. J., 63 (Hel.)
Chipail, A. (joint author), 479 (Tox.)
Choquette, L. P. E., (360) (Parasit.)
Choremis, C. & Zannos, L., 1228 (Haem.)
Chow, A. Y. (joint author), 200 (Def. Dis.)
Chow, C. Y. & Soeparmo, H. T., 790 (Mal.)
Christianson, J. F. (joint author), (605) (Haem.)
Christie, M., 644 (Mal.)
Christie, M. G., 1283 (Mal.)
Chronicle World Health Organization, 629 (Ent.)
Chu, C. C., Chih, C. C., Tsen, Y. L., Liang, Y. I. & Ting, K. S., 456 (Hel.)
——, Tsen, Y. L., Liang, Y. I. & Ting, K. S., 1207 (Hel.)
—— (joint author), 455 *bis*, 1208 *bis* (Hel.)
Chu, C. F., 1330 (Hel.)
Chu, S. H., 1433 (Hel.)
Chuang, C. H. (joint author), 730, (1216) (Hel.), 1383 (Mal.)
Chung, H. L. & Ch'en, H. C., (1014) (Misc. Dis.)
——, Hou, T. C. & Weng, H. C., 317 (Hel.)
——, Weng, H. C. & Li, J., 181 (Hel.)
Chung-Hoon, E. K. & Hedgcock, G., 576 (Lep.)
Cilli, V. & Scatozza, F., 811 (Rab.)
Ciucă, M., 779, 1291 (Mal.)
——, Chelărescu, M., Sofletea, A., Constantinescu, P., Teriteanu, E., Cortez, P., Balanovschi, G. & Ilieş, M., 529 (Mal.)
—— *et al.*, 1389 (Mal.)
Clausse, J. (joint author), 743 (Def. Dis.)
Clay, R. D. & Ross, A. A., 148 (Leish.)
Clement, D. H. (joint author), 1460 (Haem.)

Clemmons, J. J. & Angevine, D. M., (619) (Misc. Dis.)
Cleve, E. A. (joint author), 352 (Der.)
Clifford, G. O. (joint author), 341 (Haem.)
Clyde, D. F., 1154 (Mal.)
—— & Kingazi, H., 1155 (Mal.)
——, Shute, G. T. & Press, J., 392 (Mal.)
Čmelik, S. & Bartl, Z., (63) (Hel.)
Cochet, G. (joint author), 735 (Hel.)
Cochrane, J. C., Sagorin, L. & Wilcocks, M. G., 1446 (Hel.)
Cochrane, R. G., (576), 1420 (Lep.)
—— (joint author), 443 (Lep.)
Cocker, W. & McMurry, T. B. H., 324 (Hel.)
Coda, D. & Coda, M. de M., 1290 (Mal.)
Coda, M. de M. (joint author), 1290 (Mal.)
Code, C. F. (joint author), 866 (Sp.)
Codounis, A., Sapkas, A. & Oeconomidès, E., (1352) (Haem.)
Coelho, B. & Coutinho, E. M., 715 (Hel.)
Coelho, M. V. (joint author), 974, 1327 (Hel.)
Coelho, R. de B., 711 (Hel.)
Cofman, S. (joint author), 738 (Def. Dis.)
Coker, C. M., 332 (Hel.)
—— & Lichtenberg, F., 314 (Hel.)
Colas-Belcour, J. & Rageau, J., 938 (Leish.)
Cole, C. R., 476 (Tox.)
Cole, E. R. & Sewell, A. K., 892 (Lab.)
Cole, M. M. & Burden, G. S., 411 (Typh.)
—— (joint author), 363 (Ent.)
Coleman, N. (joint author), 218, 480, 608 (Tox.)
Colless, D. H., 1018, 1135 (Ent.), (1385) (Mal.)
Collet, A. (joint author), 873 (Haem.)
Collier, H. O. J., 620 (Parasit.)
—— (joint author), 545 (Tryp.)
Collier, W. A., Bueno de Mesquita, S. J. & Van Zanten, E., 1423 (Lep.)
—— & Gehr, E., 1087 (Lep.)
Collignon, E. & Juillan, M., 917 (Mal.)
Collins, C. P., 393 (Mal.)
Collins, W. E., 238 (Ent.)
Collomb, H., Gallais, P. & Planques, L., 655 (Tryp.)
—— & Levron, M., (932) (Tryp.)
——, Miletto G. & Levron, M., 403 (Tryp.)
—— (joint author), 140 (Tryp.), (475) (Haem.)
Colonial Office, 928 (Tryp.), 1258, 1261, 1376 (Reports, etc.)
Coluzzi, M. (joint author), 925 (Mal.)
Coly, M. (joint author), 1016 (Parasit.)
Commission for Technical Co-Operation in Africa South of the Sahara, 858 (Def. Dis.)
Congo Belge, 509 (Reports, etc.)
Conklin, A. (joint author), (563), 1177 (Rab.)
Conran, A. (joint author), 633 (Reports, etc.)
Conran, O. F. & Conran, A., 633 (Reports, etc.)
Consolazio, C. F., Armstrong, F. B., Dosch, E. L., Goldstein, D. R. & Guillory, R. L., 191 (Def. Dis.)
——, Crowley, L. V., Armstrong, F. B., Dorsch, I. F., Guillory, R. L. & Pollack, H., 190 (Def. Dis.)
——, Pollack, H., Crowley, L. V. & Goldstein, D. R., 191 (Def. Dis.)
—— (joint author), 191 *bis* (Def. Dis.)
Constantinescu, N., Ştirbu, A., Cheptea, A. & Taindel, C., 163 (Rab.)
Constantinescu, P. (joint author), 529 (Mal.)
Contreras, Guillén, Terencio & Tarabini, 701 (Lep.)
Contreras, F., 1320 (Lep.)
Contu, L. (joint author), 1470 (Misc. Dis.)
Converse, J. L., 755 (Der.)
Convit, J., 48, 834 (Lep.)
——, Reyes, O. & Kerdel, F., 1398 (Leish.)
——, Sisiruca, C. & Lapenta, P., 1196 (Lep.)
Cook, I. (joint author), 1068 (Typh.)
Cook, J. E., Briggs, G. W. & Horns, H. L., 121 (Mal.)
Cooke, G. M. (joint author), 1410 (Pl.)
Cooke, L. B., Jr. (joint author), (605) (Haem.)
Corbo, S. (joint author), 1344 (Hel.)
Corkill, N. L., 899 (B.R.)
Cornet, L. (joint author), 1128 (Ulc.)
Coronil, F. R., 898 (B.R.)
Corradetti, A. & Neri, I., 1294 (Mal.)
Corrêa, M. O. A. & Amato Neto, V., 1318 (Am.)
Corrêa, R. R. & Ramalho, G. R., 1020 (Ent.)
Correa Durán, A. (joint author), 935 (Tryp.)
Correa Henao, A., 1337 (Hel.)
Cort, W. W. (joint author), 840 (Hel.)
Cortez, P. (joint author), 529 (Mal.)
Costa, L. (joint author), 94 (Parasit.)
Cotrim, J. X. & Ramalho, A. C. R., 1367 (Parasit.)
Coudert, J. & Coly, M., 1016 (Parasit.)
Courdurier, J. (joint author), 424 (Pl.)
Courtois, C. (joint author), 483 (Der.)
Coutelen, F., Biguet, J., Capron, A., Deblock, S. & Langinieux, J., 330 (Hel.)
——, ——, Cochet, G., Deblock, S. & Capron, A., 735 (Hel.)
Coutellier, J., 120 (Mal.)
Coutinho, E. M., 1427 (Hel.)
—— (joint author), 715 (Hel.)
Coutinho, J. O., 710 (Hel.), 757 (Parasit.), 1305 (Leish.)
—— & Rabelo, E. X., 1084 (Am.)
Covell, G., 263, 642 (Mal.)
Coyne, F. (joint author), 290 (Am.)
Craddock, A. L., 557 (Typh.)
Cravioto, J. (joint author), 199, 333, (1346), 1346, 1451 *bis*, 1453 (Def. Dis.)
Creamer, A. A. & Brown, A. L., 31 (Rab.)
Creitz, J. R., 612 (Der.)
Creţu, S. (joint author), 148 (Leish.)
Crewe, W. (joint author), 466 (Hel.), 544 (Tryp.)
Cridland, C. C., 707 (Hel.)
Crippen, D. A. (joint author), (605) (Haem.)
Crisp, G., 106 (Reports, etc.), 328, 594, 595 (Hel.)
Cristescu, A. (joint author), 1398 (Leish.)
Crocker, T. T., Chen, T. H. & Meyer, K. F., 677 (Pl.)
Crofton, H. D. (joint author), (722) (Hel.)
Crosskey, R. W., 596, 855, 1114 (Hel.)
Crowden, G. P., 1242 (Heat Str.)
Crowley, L. V., Godber, J. T., Consolazio, C. F., Goldstein, D. R., Smith, E. P., Lewis, O. H., Ryer, R. R. & Pollack, H., 191 (Def. Dis.)
——, Pollack, H. & Brockett, J. R., Jr., 191 (Def. Dis.)
——, Ryer, R. R. & Pollack, H., 191 (Def. Dis.)
—— (joint author), 191 *ter* (Def. Dis.)
Crowley, M. F., McSorley, J. G. A., Aksoy, M. & Lehmann, H., 1118 (Haem.)
Cruickshank, E. K., 741 (Def. Dis.)
Crutkhow, C. (joint author), 286 (Pl.), 1139 (Ent.)

Cruz, A. E. (joint author), 1444 (Hel.)
Csillag, A., 881 (Parasit.)
Cuadra C., M., 156 (Bart.)
Culbertson, C. (joint author), 39 (Am.)
Culbertson, C. G. (joint author), 420 (Rab.)
Cumbie, B. G. (joint author), 308 *bis*, 1325 (Hel.)
Cumsille, E. (joint author), (1106) (Hel.)
Curiel, D., 897 (B.R.)
Cutchins, E. C. & Warren, J., 220 (Tox.)
Cutler, J. L. (joint author), 990 (Def. Dis.)
Cwilich, R., Mer, G. G. & Meron, A. V., 889 (Ent.)
—— (joint author), 888, 1021 (Ent.)

D

Da Costa, G. J. (joint author), (605) (Haem.)
Da Cruz-Ferreira, F. S. & Sterenberg, H., 688 (Ys.)
Dagert Boyer, C. (joint author), 143 (Tryp.), (611) (Tox.)
Dalip Singh, (731) (Hel.)
Dalith, F. (joint author), 1241 (Der.)
Danaraj, T. J., 490 (Misc. Dis.), 1342 (Hel.)
——, da Silva, L. S. & Schacher, J. F., 1341 (Hel.)
—— (joint author), 1442 (Hel.)
Danaraj, W., (571) (Am.)
Dao, C., Ch'i, W. L. & Ts'ai, Y. H., 1105 (Hel.)
Darcourt (joint author), 982 (Hel.)
Das, A. K., Chatterjee, M. K. & Deb Sikdar, B. M., 85 (Der.)
Da Silva, J. R., 310 (Hel.)
—— & De Paola, D., 273 (Leish.)
Da Silva, L. H. P., De Carvalho, S. B. & Carneiro, M. N. R., 1299 (Tryp.)
—— (joint author), 94 (Parasit.)
Da Silva, L. S. (joint author), 1341 (Hel.)
Da Silva, W. B., (1466) (Der.)
Das Gupta, B. (joint author), 274 (Leish.)
Dasgupta, B. & Ray, H. N., (1248) (Ent.)
Dat-Xuong, N. (joint author), 832 (Lep.)
D'Aubenton, F. (joint author), 1342 (Hel.)
D'Avanzo, G., 1007 (Der.)
Davey, T. F., Kissaun, A. M. & Moneta, G., 831 (Lep.)
—— (joint author), 1194 (Lep.)
David, A. & Satya Prakash, (1062) (Tryp.)
—— (joint author), (271), 797 (Tryp.)
Davidson, G., 124 *bis* (Mal.), 767 (Ent.)
Davidson, L. S. P., 472 (Haem.)
Davies, A. H. (joint author), 389 (Mal.)
Davies, C. S., 264 (Mal.)
Davies, D. M. & Peterson, B. V., (628) (Ent.)
Davies, J. B. M. (joint author), 735 (Hel.)
Davies, J. N. P., 203 (Def. Dis.), 488 (Misc. Dis.)
Davies, M. (joint author), 1256 (Ent.)
Davis, G. E. & Mavros, A. J., 889 (Ent.)
Davis, M. J. & Vander Ploeg, D. E., 1154 (Mal.)
Davison, A. R., 827, 1199, 1421 (Lep.)
Dawood, M. M. & Gismann, A., 1380 (B.R.)
De Alencar, J. E., Holanda, D. & Cavalcante, J. D. N., 1302 (Leish.)
De Almeida, A. M. (joint author), 709 (Hel.)
De Almeida, A. P. (joint author), 1086 (Lep.)
De Almeida, J. O., Carvalho, R. P. S. & Padron, C., 703 (Lep.)
Dean, R. F. A., 78, 989 (Def. Dis.)
—— & Skinner, M., 863 (Def. Dis.)
—— (joint author), 203, 1224 (Def. Dis.), 1374 (Misc. Pap.)
De Andrade, L. M. C. (joint author), 445 (Lep.)
Deane, L. M. & Deane, M. P., 274, 549 (Leish.)
—— (joint author), 409 (Leish.)
Deane, M. P. & Deane, L. M., 409 (Leish.)
—— (joint author), 274, 549 (Leish.)
Deanović, Z. (joint author), 757 (Parasit.)
De Aquino, U. M., 575, 964 (Ys.)
De Barros, O. M., Giannoni, F. G., Marigo, C. & Frizzo, F. J., (587) (Hel.)
De Barros Coelho, R., 1426 (Hel.)
Debbink, J. P. (joint author), (874) (Vms.)
Debelmas, A. M. (joint author), 582 (Hel.)
Deblock, S. (joint author), 330, 735 (Hel.)
De Bondt, A. F., 1324 (Hel.)
Deb Sikdar, B. M. (joint author), 85 (Der.)
De Carneri, I., 1016 (Parasit.)
De Carvalho, A. G., (396) (Mal.)
—— & Verano, O. T., 407, (933) (Tryp.)
De Carvalho, G. (joint author), 1444 (Hel.)
De Carvalho, S. B. (joint author), 1299 (Tryp.)
De Coster, P. (joint author), 1338 (Hel.)
De Coursey, J. D. & Otto, J. S., 431 (Am.)
— —, —— & Holderman, B. S., 569 (Am.)
Deegan, T., Gilles, H. M. & McGregor, I. A., 602 (Haem.)
—— (joint author), 853 (Hel.)
De Faria, J. L., 310 (Hel.)
De Freitas, J. L. P. (joint author), 146 (Tryp.)
Dehez, F. (joint author), 441, 701 (Lep.)
Deiana, S. (joint author), 1023 (Ent.)
De la Peña, C. (joint author), 333, 1453 (Def. Dis.)
Delas, A. (joint author), 1386 (Mal.)
Delascio, D., 1004 (Tox.)
De la Vaissiere, C. (joint author), (208), (209) (Haem.)
Del Campo, A. (joint author), 21 (Typh.)
Del Negro, G. (joint author), 355 (Der.)
Delon, J. & Geffroy, A., (983) (Hel.)
DeLong, D. M. (joint author), 885 (Ent.)
Delons, S. (joint author), (866) (Haem.)
De Los Angeles Sandoval, M. (joint author), 876 (Der.)
Del Vecchio, V., 1407 (Rab.), 1461 (Vms.)
De Macedo, O. B. & Berti, F., 54 (Lep.)
De Magalhaes, E. M. (joint author), 976 (Hel.)
De Magalhães, O., 22, 275 (Typh.)
Demarchi, M. (joint author), 738 (Def. Dis.)
De Medeiros, L. (joint author), 969 (Hel.)
De Meillon, B., 588 (Hel.), 784 (Mal.)
—— & Paterson, S., 839 (Hel.)
—— (joint author), 1101 (Hel.)
De Meira, M. T. V., 1345 (Def. Dis.)
—— & De Sousa, H. T., (333) (Def. Dis.)
De Moraes, J. G. (joint author), 709, 714 (Hel.)
De Morais, T., 57, 1323 (Hel.)
De Moura, J. V. (joint author), 1385 (Mal.)
De Negri, U. (joint author), 5 *bis* (Mal.)
Denes de Negri, R. & Luppi, A., 1211 (Hel.)
Denny, W. F., Finn, T. O. & Bird, R. M., 1000 (Haem.)
Dent, J. H., (1106) (Hel.)
Deoras, P. J. & Tonpi, K. V., 1409 (Pl.)
De Paola, D. (joint author), 273 (Leish.)
DePass, E. (joint author), 468, 862 (Def. Dis.)

Depieds, R. & Faure, A., 13 (Mal.)
—— (joint author), 45 (R.F.)
Depoux, R., Merveille, P. & Ceccaldi, J., 539 (Tryp.)
De Prada, J., (983) (Hel.)
Derbes, V. J. (joint author), 1002 (Vms.)
De Rodaniche, E., 158 (Y.F.)
—— & Galindo, P., 1310 (Y.F.)
—— (joint author), 674 (Y.F.)
De Roever-Bonnet, H., 875 (Tox.)
De Rook, H., 1214 (Hel.)
Derrien, Y. (joint author), (475) (Haem.)
Deschiens, R., 1015 (Parasit.), 1103, (1323) *bis* (Hel.)
—— & Bénex, J., 65, 186, 1442 (Hel.)
—— & Bijan, H., 709 (Hel.)
——, Lamy, H. & Molinari, V., 1101 (Hel.)
—— & Molinari, V., 1103 (Hel.)
——, Pick, F. & Sarauw, U., 398 (Mal.)
—— & Poirier, M., 229 (Misc. Dis.)
—— (joint author), 318 (Hel.)
Desikachar, H. S. R., Sankaran, A. N. & Subrahmanyan, V., 859 (Def. Dis.)
De Siqueira-Jaccoud, R. J. (joint author), 262 (Mal.)
Deslandes, N. (joint author), 60, (181), (452) (Hel.)
De Smet, M. P. & Lahon, H., 1376 (Misc. Pap.)
Desnues (joint author), 946 (Typh.)
De Sousa, H. T. (joint author), (333) (Def. Dis.)
De Souza, J. L., Lacaz, C. da S. & Pasqualucci, M. E. A., 879 (Misc. Dis.)
De Souza, P. R. (joint author), 1194 (Lep.)
De Souza-Araujo, H. C., 1029 (B.R.)
Destombes, P. (joint author), 176 (Lep.)
Dethier, V. G., (759), 1025 (Ent.)
Devémy, P. (joint author) 760 (Ent.)
De Vera Andrey, R. (joint author), 955 (R.F.)
De Vries, A., Kessler, J., Lehmann, E. E. & Rabinovici, N., 170 (Am.)
—— (joint author), 873 (Vms.)
DeWitt, E. B., 1205 (Hel.)
Dexter, M. W. (joint author), 1140 (Ent.)
Dey, N. C. & Kuar, B., 434 (Am.)
—— (joint author), (484), 1125 (Der.)
De Zulueta, J., 779 (Mal.)
——, Jolivet, P., Thymakis, K. & Caprari, P., 1052 (Mal.)
—— & Lachance, F., 779 (Mal.)
D'Haussy, R., Pfister, R., Rit, J. M. & Breteau, G., 1216 (Hel.)
—— (joint author), 328 (Hel.)
Dhawan, B. N. (joint author), (1002) (Vms.)
Dhir, S. L. & Amrik Singh, 1156 (Mal.)
—— & Rahim, A., 1391 (Mal.)
Dhopeshwarkar, G. A. (joint author), 1353 (Vms.)
Diacono, G. (joint author), (475) (Haem.)
Diacono, H. & Castay, M., 872 (Haem.)
Dias, E., 144, 272 (Tryp.)
—— & Zeledón, R., 145 (Tryp.)
—— (joint author), 660 (Tryp.)
Díaz Alcayaga, M., (1062) (Tryp.)
Díaz Nájera, A. (joint author), 1055 (Mal.)
Diaz-Ungria, C., (837) (Hel.)
Di Bello, R., (459), (847) (Hel.)
Dickman, F. N. (joint author), 1338 (Hel.)
Di Egidio, M., 1429 (Hel.), 1469 (Misc. Dis.)
Diggs, L. W., 871 (Haem.)
—— (joint author), 999 (Haem.)
Dighiero, J. (joint author), 1439 (Hel.)
Dikshit, P. K., Mohan, B. N. & Joshi, J. G., 884 (Ent.)
Dill, W. A., Fisken, R. A., Reutner, T. F., Weston, J. K., & Glazko, A. J., 820 (Am.)
—— (joint author), 821 (Am.)
Dimmette, R. M., 196 (Def. Dis.)
Dimond, J. B., Lea, A. O., Brooks, R. F. & DeLong, D. M., 885 (Ent.)
Di Prisco, E. (joint author), 1336 (Hel.)
Di Sapio, G. & Lecaldano, E., 806 (Typh.)
Dissanaike, A. S., Dissanaike, G. A. & Niles, W. J., 849 (Hel.)
——, ——, —— & Surendranathan, R., 1215 (Hel.)
Dissanaike, G. A. (joint author), 849, 1215 (Hel.)
Dixon, C. F. (joint author), 61 (Hel.)
Djanian, A. Y. (joint author), 1335 (Hel.)
Dobrowolska, H. (joint author), 985 (Hel.)
Dobson, R. L. & Lobitz, W. C., Jr., 1244 (Heat Str.)
Dockeray, G. C. (joint author), 321 (Hel.)
Dodge, H. J. (joint author), 1363 (Heat Str.)
Dodin, A. (joint author), 420 (Rab.)
—— & Brygoo, E. R., 677 (Rab.)
—— (joint author), 677 (Rab.)
Dodu, S. R. A. & Edington, G. M., (487) (Misc. Dis.)
Doherty, R. L., 151 (Typh.), 1312 (Den.)
Domaradsky, I. V. & Ivanov, V. A., 814 (Pl.)
Dominguez, A., Potenza, L. & Piek, W., (562) (Rab.)
Dominiczak, K., 497 (Parasit.)
Donckaster, R., Sapunar, J. & Donoso, A., 1190 (Am.)
Donoso, A. (joint author), 1190 (Am.)
Donoso Medina, F., 823 (Am.)
Doraisingham, M., 509 (Reports, etc.)
Dornier, R. (joint author), (843) (Hel.)
Do Rosário, M. R. & Parreira, F., (746) (Haem.)
Dorrance, W. R. (joint author), 419 (Den.)
Dorsch, I. F. (joint author), 191 (Def. Dis.)
Dos Santos, M. R. (joint author), 1304 (Leish.)
Dosch, E. L. (joint author), 191 (Def. Dis).
Doucet, J. (joint author), 261, 1287 (Mal.)
Doucette, J. (joint author), 223 (Der.)
Doull, J. A., 297 (Lep.)
Doupagne, P. (joint author), 483 (Der.)
Doury, P., 549 (Leish.), (1373) (Ent.)
Dow, R. P., Reeves, W. C. & Bellamy, R. E., 1249 (Ent.)
Dowling, J. H. & Levine, H. B., (230) (Misc. Dis.)
Downs, W. G., Anderson, C. R. & Theiler, M., 26 (Den.)
—— (joint author), 26 (Den.)
Draper, C. C., 1283 (Mal.)
—— & Smith, A., 917 (Mal.)
Dressler, H. R. (joint author), 940 (Typh.)
Driss, M. Z., 1319 (Am.)
Drury, M. I., 597 (Hel.)
Dubinin, V. B., 231 (Parasit.)
Dubinina, M. N., 231 (Parasit.)
—— & Smogorzhevskaya, L. A., 231 (Parasit.)
Dubois, A., 831 (Lep.)
—— & Limbos, P., 408 (Leish.)
—— (joint author), 796, 1203 (Tryp.)
Ducros, H. (joint author), 616 (Heat Str.)
Duffin, W. M. & Rollo, I. M., 1161 (Mal.)
Duggan, A. J., 106 (Reports, etc.)
—— (joint author), 540 (Tryp.)

Duke, B. O. L., 732, 852 (Hel.)
——, Crewe, W. & Beesley, W. N., 466 (Hel.)
—— & Hawking, F., 592 (Hel.)
Duke-Elder, S., 594 (Hel.)
Dumoulin, F. V. B. & Bryan, J., 1400 (Typh.)
Dunacva, T., 1267 (Reports, etc.)
Dungal, N., 1435 (Hel.)
Dupin, H. (joint author), 203, 1453 (Def. Dis.)
Du Plessis, D. J., 199 (Def. Dis.)
Duport, M. (joint author), 1398 (Leish.)
Duran-Jorda, F., 1448 (Hel.)
Durant, R. C. (joint author), 1360 (Oph.)
Durieux, J. (joint author), (475) (Haem.)
Dutertre, J. (joint author), 140 (Tryp.)
Dutrenit, J. (joint author), 599 (Def. Dis.)
Duzer, A. (joint author), 784 (Mal.)
Dyk, V., 1268 (Reports, etc.)
Dzagurov, S. G. (joint author), (1171) (Typh.)
Dzięciołowski, Z. (joint author), 573 (Am.)

E

Eads, R. B. & Strom, L. G., 1404 (Y.F.)
—— (joint author), (563), 1177 (Rab.)
East Africa High Commission, 769, 892, 1261 (Reports, etc.), 1283 (Mal.)
East African Med. J., 1419 (Lep.)
Eastman-Nagle, E. R. D., 59 (Hel.)
Easton, J. G. & Wright, P. M., 604 (Haem.)
Eby, T. M. (joint author), 191 (Def. Dis.)
Echavez, P. S., (534) (Mal.)
Echeverria Alvarez, E. & Leon Moreno, A., 173 (Am.)
Edelman, M. H. (joint author), 712 (Hel.)
Edeson, J. F. B., Hawking, F. & Symes, C. B., 1340 (Hel.)
—— (joint author), 1155 (Mal.)
Edington, G. M., 1011 *bis* (Misc. Dis.), 1202 (Hel.), 1348 (Haem.)
—— & Laing, W. N., 1231 (Haem.)
—— & Lehmann, H., 603 (Haem.)
—— & Smith, A. N., 873 (Haem.)
—— & Tettey, C., (1142) (Misc. Pap.)
—— (joint author), (487) (Misc. Dis.)
Edwards, E. E., 74 (Hel.)
——, Judd, J. M. & Squire, F. A., (143) *bis*, (932) (Tryp.)
Eftekhari, M. (joint author), 1076 (Pl.)
Ehrenford, F. A., 848 (Hel.)
Eichenwald, H. F., 477 (Tox.)
Eichler, W., 265 (Mal.)
Ejercito, A., 129 (Mal.)
Elbel, R. E. & Thaineua, M., 1186 (Pl.)
Elek, S. D. & Hilson, G. R. F., 447 (Lep.)
El-Gindy, M. S., 1424 (Hel.)
Elliott, R. (joint author), 1052 (Mal.)
Ellis, J. L. & Van Gool, J., 1232 (Haem.)
Elsdon-Dew, R., 165 (Am.)
—— (joint author), 431 (Am.)
El-Shawarby, K. (joint author), 994 (Def. Dis.)
Elton, N. W., 417 (Y.F.)
Emerson, G. A. (joint author), 682 (Am.)
Emerson, S. M. (joint author), 331 (Hel.)
Englesberg, E., 1409 (Pl.)
Enright, J. B., Sadler, W. W. & Thomas, R. C., 1309 (Typh.)
Enriqueta Perez-Gimenez, M. (joint author), 1336 (Hel.)
Ensink, G. J. (joint author), 669 (Typh.)
Erhard, A. & Wellensiek, U., 1380 (B.R.)
Erhardova, B. (joint author), 1268 (Reports, etc.)
E Silva, C. O. (joint author), 445 (Lep.)
Essellier, A. F. (joint author), 41 (Am.)
Estève, H., 1268 (Reports, etc.)
Etcheverry, R., Regonesi, C., Guzman, C., Katalinic, V., Naquira, F. & Thiermann, E., 479 (Tox.)
Evans, A. D., 20 (Typh.)
Evans, A. S. & Stirewalt, M. A., 839 (Hel.)
Evans, C. A. (joint author), 282, 419 (Den.)
Evans, J. R., 473 (Haem.)
Evens, F., 136 (Tryp.)
—— (joint author), 658 (Tryp.)
Eyles, D. E., 477, 478 (Tox.)
—— & Coleman, N., 480 (Tox.)
——, —— & Cavanaugh, D. J., 218 (Tox.)
—— (joint author), 7 (Mal.), 608 (Tox.)

F

Fabiani, G. & Orfila, J., 13, 537, 654 (Mal.)
Facio, G. (joint author), 962 (Ys.)
Fain, A., 460, 1107, 1108 (Hel.)
—— & Falaise, A., 1221 (Def. Dis.), 1245 (Misc. Dis.)
—— & Vandepitte, J., 980 (Hel.)
Fairbairn, D. (joint author), (1337) (Hel.)
Fairbairn, H., 400 (Tryp.)
—— & Williamson, J., 268 (Tryp.)
Fairley, N. H., 747 (Vms.)
Fakir, M. T., 789 (Mal.)
Falaise, A. (joint author), 1221 (Def. Dis.), 1245 (Misc. Dis.)
Falcke, H. C. (joint author), 78 (Def. Dis.)
Fales, J. H., Bodenstein, O. F. & Beroza, M., 887 (Ent.)
Fameliaris, G. (joint author), 919 (Mal.)
Fan, P. C. & Hsu, J., 66, 1443 (Hel.)
——, —— & Liu, J. C., (1323), 1338, (1343) (Hel.)
Farid, M. A., 647, 788 (Mal.)
Farinacci, C. F. (joint author), 29 (Rab.)
Farrell, C. E., (505) (Ent.)
Faure, A. (joint author), 13 (Mal.), 45 (R.F.)
Faure, H. (joint author), 457 (Hel.)
Faure, P. (joint author), 625 (Ent.)
Faust, E. C., 854 (Hel.)
—— (joint author), 233 (Parasit.)
Fausto, P. F., (1419) (Ys.)
Fava Netto, C., 354 (Der.)
—— & Del Negro, G., 355 (Der.)
—— (joint author), 86 (Der.)
Fawdry, A. L., 1114 (Hel.)
Fay, R. W. (joint author), 6 (Mal.), 239 (Ent.)
Fedorov, M. N., 680 (Pl.)
Fedorova, N. I., Bektemirov, T. A., Tarasevich, I. V., Kerbabaev, E. B. & Semashko, L. L., 555 (Typh.)
—— (joint author), 155, 559 (Typh.)
Feigenbaum, A., Landau, J., Gurevitch, J. & Shamir, R., 88 (Oph.)
—— (joint author), 615 (Oph.)
Feldman, H. A. & Miller, L. T., 477, 875 (Tox.)
Feldman, W. H., 296 (Lep.)
Feldman-Muhsam, B., (1254) (Ent.)
Fellman, N. (joint author), 417 (Typh.)

Felsenfeld, O. & Rokkaku, W. K., 680 (Chl.)
Fendall, N. R. E. (joint author), 17 (Leish.)
Fenton, R. L. & Austin, F. H., (696) (Lep.)
Ferguson, A. D. (joint author), 341 (Haem.)
Ferguson, F. F. & Gerhardt, C. E., 711 (Hel.)
Fermus, R. (joint author), 1356 (Tox.)
Fernández, J. M. M., 697 (Lep.)
—— (joint author), 178 (Lep.)
Ferrara, A., Andrini, F., Orlandella, V. & Santoro, S., 1355 (Tox.)
——, Tigano, F. & Servadei, B., 1317 (Am.)
Ferraz, N. de T. (joint author), 446 *bis* (Lep.)
Ferro-Luzzi, G., Lanzo, A. & Mueller, R., 738 (Def. Dis.)
Fettich, D. (joint author), 95 (Parasit.)
Fialho, S. A., Teixeira, I. & Paraguassú, L., 1465 (Tox.)
Field, J. W. & Shute, P. G., 110 (B.R.)
Fife, E. H., Jr. (joint author), 548 (Tryp.)
Figueroa, L., Casanueva, M. & Cumsille, E., (1106) (Hel.)
Finch, C. A. (joint author), 606 (Haem.)
Findakly, S. (joint author), 738 (Def. Dis.)
Findlay, G. H., 1124 (Der.)
Finelle, P. (joint author), 1022 (Ent.)
Finkelstein, R. A. & Lankford, C. E., 1077 (Chl.)
Finn, T. O. (joint author), 1000 (Haem.)
Fiset, P., 1171 (Typh.)
—— (joint author), 416 (Typh.)
Fisk, F. W. (joint author), 242 (Ent.)
Fisken, R. A. (joint author), 820, 821 (Am.)
Fite, G. L., 297, 1191 (Lep.)
Fletcher, T. E. & Press, J. M., 1284 (Mal.)
Flint, W. F. (joint author), 607 (Tox.)
Floch, H., 130, 652, 924, 1055 (Mal.), 175, 440, 441, 444 *bis*, 580, 831 (Lep.)
—— & André, J., 176 (Lep.)
—— & Boulan, S., 935 (Tryp.)
—— & Dehez, F., 441 (Lep.)
——, —— & Mailloux, M., 701 (Lep.)
—— & Mailloux, M., 700 (Lep.)
Floriani, C., Cellerino, N. A. & Cellerino, R. J., 44 (Am.)
Fomm, A. S. (joint author), (1374) (Ent.)
Fontan, R. (joint author), 578, 579 *bis* (Lep.)
Fontana, P., Jr. (joint author), 262 (Mal.)
Food and Agriculture Organization of the United Nations, 1456 (Def. Dis.)
Forattini, O. P. & Dos Santos, M. R., 1304 (Leish.)
Ford, J., 1261 (Reports, etc.)
Fort, M. (joint author), 758 (Parasit.)
Foryś, S., Lutyński, R. & Raginis, Z., 1307 (Typh.)
Foster, A. O. (joint author), (1368) (Parasit.)
Fournier, J. (joint author), 92 *bis* (Misc. Dis.)
Fowler, K. S. (joint author), (239) (Ent.)
Fox, I., 276 (Typh.)
——, Grace, W. J. & Debbink, J. P., (874) (Vms.)
Foy, H. & Kondi, A., 79, 1457 (Haem.)
Fraga de Azevedo, J. & Carvao Gomes, F. A., 1327 (Hel.)
—— & De Medeiros, L., (969) (Hel.)
—— & Gomes, F. C., 976 (Hel.)
——, ——, Baptista, A. M. & De Magalhaes, E. M., 976 (Hel.)
—— & Gonçalves, M. M., (1326) (Hel.)
Franco, A. (joint author), 271 (Tryp.)
Franco, L. T. de A., 270 (Tryp.)
Frankel, J. W. (joint author), 419 (Den.)
Fraser, D. M. & Kermack, W. O., 793 (Mal.)
Freire, S. A., 175 (Lep.)
French, J. M., Gaddie, R. & Smith, N. M., 336 (Sp.)
Frenk, S., Metcoff, J., Gómez, F., Ramos-Galván, R., Cravioto, J. & Antonowicz, I., 1451 (Def. Dis.)
—— (joint author), 199, 333, (1346), 1346, 1451, 1453 (Def. Dis.)
Frenkel, J. K., 478 (Tox.)
Freter, R., 38 *bis*, 681 (Chl.)
Freytag, R. E. (joint author), 880 (Parasit.)
Frick, L. P., Lin, S. S. & Williams, J. E., 315 (Hel.)
——, Moon, A. P. & Lin, S. S., 232 (Parasit.)
—— (joint author), 1331 (Hel.)
Friedheim, E. A. H., 971 (Hel.)
Friedman, L., Smith, C. E., Pappagianis, D. & Berman, R. J., 222 (Der.)
——, ——, Roessler, W. G. & Berman, R. J., 351 (Der.)
Fritschi, E. P., 53 (Lep.)
Frizzi, G. & Holstein, M., 919 (Mal.)
—— & Ricciardi, I., 261 (Mal.)
—— (joint author), 5 *bis* (Mal.)
Frizzo, F. J. (joint author), (587) (Hel.)
Fromentin, H., 15 (Tryp.)
Frontali, N., 239 (Ent.)
Frootko, J. (joint author), (1007) (Der.)
Frost, J. W., Goldwein, M. I. & Kaufman, B. D., 1457 (Sp.)
Frumin, A. M. (joint author), 998 (Haem.)
Fry, B. A. (joint author), 1239 *bis* (Tox.)
Frye, W. W. (joint author), 1081, 1412 (Am.)
Fryer, J. D., Johns, D. L. & Yeo, D., 1395 (Tryp.)
Fryer, S. H., 1255 (Ent.)
Frygin, C. (joint author), 807, 808 (Typh.)
Fu, F. Y., Ch'i, W. L., Ho, T. C., Wang, C. L. & Wang, C., 587 (Hel.)
Fuerst, H. T. (joint author), 857 (Hel.)
Fuhrmann, G., 1110 (Hel.)
Fujita, H., Suzuki, T. & Horikawa, T., 152, 153 (Typh.)
Fujiya, H. (joint author), 278 (Typh.)
Fukui, G. M., Lawton, W. D., Janssen, W. A. & Surgalla, M. J., 816 (Pl.)
Fulcrand, G. (joint author), (866) (Haem.)
Fullerton, W. J. (joint author), 478 (Tox.)
Fulton, J. D., 1121 (Tox.), 1414 (Am.)
—— & Grant, P. T., 542 (Tryp.)
—— & Spooner, D. F., 930 (Tryp.), 1236 (Tox.)
—— (joint author), 1163 (Tryp.)

G

Gabaldon, A., 652 (Mal.)
Gaburro, D. & Del Campo, A., 21 (Typh.)
Gac. Méd. de Caracas, 209 (Haem.)
Gaddie, R. (joint author), 336 (Sp.)
Gadgil, R. K. & Shah, S. N., 302 (Hel.)
Gail, R. & Rageau, J., 752 (Vms.)
Gaillard, F. (joint author), 290 (Am.)
Gaitonde, B. B. (joint author), 1452 (Def. Dis.)
Gajdusek, D. C., 881 (Parasit.)
Galbiati, F., 240 (Ent.)
Galindo, P., De Rodaniche, E. & Trapido, H., 674 (Y.F.)
—— & Trapido, H., 1071 (Y.F.)

Galindo, P., (joint author), 1070, 1310 (Y.F.)
Gall, D., 931 (Tryp.)
——, Hutchinson, M. P. & Yates, W., 1295 (Tryp.)
Gallais, P., Collomb, H. & Miletto, G., (475) (Haem.)
——, ——, ——, Dutertre, J. & Bérard-Badier, 140 (Tryp.)
——, Ruzié, J. & Darcourt, 982 (Hel.)
—— (joint author), 655 (Tryp.)
Galliard, H., (1342) (Hel.)
Gallut, J., 1411 (Chl.)
Galuzo, I. G., 1267 (Reports, etc.)
Gamble, J. L. (joint author), (1346), 1451 (Def. Dis.)
Gan, K. H. & Heath, A. A., 223 (Oph.)
——, Warsa, R., Go Ing Gan, Lo Siauw Koen & Sujudi, 223 (Oph.)
Ganatra, R. D., Dhopeshwarkar, G. A., Sheth, U. K. & Lewis, R. A., 1353 (Vms.)
—— & Lewis, R. A., 617 (Misc. Dis.)
——, Paralker, N. A. & Lewis, R. A., 822 (Am.)
Gândara, Á. F., 626 *ter* (Ent.)
—— (joint author), (266) (Mal.)
Gandra, Y. R., 740, 741 (Def. Dis.)
Ganguli, N. C. (joint author), 409 (Leish.), 424 (Chl.)
Gaon, J. (joint author), 552 (Typh.)
Garabedian, G. A., Matossian, R. M. & Djanian, A. Y., 1335 (Hel.)
Garcia, A. P. (joint author), 1462 (Tox.)
Garcia Antillón, L. (joint author), (1346) (Def. Dis.)
Garcin, D. (joint author), (837) (Hel.)
Gardner, F. H., 334 (Sp.)
—— & Santiago, E. P., 204 (Sp.)
Gariou, J. (joint author), 1248 (Ent.)
Garlick, J. P. & Barnicot, N. A., 1230 (Haem.)
Garnham, P. C. C., 547 (Tryp.), 784, 795 (Mal.), 1121 *bis* (Tox.)
——, Lainson, R. & Gunders, A. E., 1292 (Mal.)
Garrett-Jones, C., 1046 (Mal.)
—— (joint author), 1046 (Mal.)
Garrod, L. P., 620 (Parasit.)
Gaschen, H., Matthey, G. & Jomini, P., 979 (Hel.)
G. E. N. Caracas, 897 (B.R.)
Gatenby, P. B. B., 473 (Haem.)
Gaud, J., 583 (Hel.), 619 (Parasit.)
—— & Chedecal, M., 623 (Parasit.)
——, Laurent, J. & Faure, P., 625 (Ent.)
Gauld, R. L. (joint author), 1363 (Heat Str.)
Gault, E. W. & Webb, J. K. G., 1471 (Misc. Dis.)
Gavilita, L. (joint author), 479 (Tox.)
Gear, J. & Reid, F. P., 809 (Den.)
Geber, M. & Dean, R. F. A., 1374 (Misc. Pap.)
Geffroy, A. (joint author), (983) (Hel.)
Gehr, E., 828, 1087 (Lep.)
—— & Stolze, E., 298 (Lep.)
—— (joint author), 1087 (Lep.)
Geib, A. F. (joint author), (502) (Ent.)
Geigy, R., 934 (Tryp.)
—— & Aeschlimann, A., 825 (R.F.)
——, Mooser, H. & Weyer, F., 45 (R.F.)
—— & Wagner, O., (826) (R.F.)
Gelfand, M., 229 (Misc. Dis.), (1376) (Misc. Pap.)
—— & Carr, W. R., 744 (Def. Dis.)
—— & Mitchell, J. D., 618 (Misc. Dis.)
—— (joint author), 1223 (Def. Dis.)
Geller, E. R., (988) (Hel.)
Genereaux, B. D. (joint author), 342 (Haem.)
Gentile, A. (joint author), 812 (Rab.)
Gentry, J. W. & Hubert, A. A., 1370 (Ent.)
Georch, D. (joint author), 668 (Typh.)
Georges, A. & Lechat, M., 702 (Lep.)
—— & Sarton, B., (702) (Lep.)
Gerasyuk, L. G. (joint author), 558 (Typh.)
Gerbec, M. & Morelj, M., 556 (Typh.)
—— (joint author), 281, (945) (Typh.)
Gerhardt, C. E. (joint author), 711 (Hel.)
Germer, W. D., 356 (Misc. Dis.)
Gerolt, P., 1479 (Ent.)
Gerritsen, T. (joint author), 577 (Lep.)
Gersdorff, W. A., Mitlin, N. & Piquett, P. G., 1138 (Ent.)
—— & Piquett, P. G., 1139 (Ent.)
——, —— & Beroza, M., (1477) *bis* (Ent.)
Gerwel, C., Kasprzak, W. & Pawłowski, Z., 756 (Parasit.)
—— & Pawłowski, Z., 300 (Hel.)
Gevaudan, P. (joint author), 535 (Mal.)
Ghalioungui, P., Nagaty, H. F., El-Shawarby, K., Rifaat, M. A. & Sadek, M. A., 994 (Def. Dis.)
Ghorai, P. C. (joint author), 817 (Chl.)
Ghosh, H. (joint author), 953 (Chl.)
Giannoni, F. G. (joint author), (587) (Hel.)
Gibbs, H. C., 1439 (Hel.)
Gibson, C. L., 479 (Tox.)
——, Eyles, D. E., Coleman, N. & Smith, C. S., 608 (Tox.)
Gibson, F. D. (joint author), 1289 (Mal.)
Giglioli, G., 919 (Mal.)
Gilbert, I. H., 1251 (Ent.)
——, Gouck, N. K. & Smith, C. N., 1250 (Ent.)
Gilkes, C. D., Kellett, F. R. S. & Gillette, H. P. S., 159 (Y.F.)
Gilles, H. M., 889 (Ent.), 921 (Mal.)
—— (joint author), 389 (Mal.), 602 (Haem.)
Gillett, J. D., 627 *bis* (Ent.)
Gillette, H. P. S. (joint author), 159 (Y.F.)
Gillies, M. T., 919 *bis*, (920), 1283 (Mal.)
Gillman, T., Lamont, N. McE., Hathorn, M. & Canham, P. A. S., 1364 (Misc. Dis.)
Gillot, F. (joint author), (408) (Leish.)
Gil Yepez, C. & Sanabria, A., 898 (B.R.)
Gimeno de Sande, A., 575 (R.F.)
Ginsberg, A., Cameron, J., Goddard, W. B. & Grieve, J. M., 718 (Hel.)
Giorn. di Malattie Infettive e Parassit., 1355 (Tox.)
Girdwood, R. H., 335 (Sp.)
Girolami, M., 995 (Sp.)
Giroud, P. (joint author), 156, (802) *bis*, (803) (Typh.)
Gismann, A., 56 (Hel.)
—— (joint author), 1380 (B.R.)
Gitter, S., Kochwa, S., De Vries, A. & Leffkowitz, M., 873 (Vms.)
Giudicelli, P. (joint author), 1096 (Hel.)
Giuntini, J. (joint author), 1402 (Bart.)
Gizmann, A. (joint author), 56 (Hel.)
Gjullin, C. M. & Isaak, L. W., 1475 (Ent.)
Glaser, E. M. & Livett, B. H., 1222 (Def. Dis.)
—— & Newling, P. S. B., 1362 (Heat Str.)
Glasgow, J. P., 657 (Tryp.), 1262 (Reports, etc.)
—— (joint author), 400 (Tryp.)
Glazko, A. J. (joint author), 820, 821 (Am.)
Gleiser, C. A., Thiel, J. & Cashell, I. G., 1065 (Leish.)

Glick, L., 786 (Mal.)
Glorieux, M., 1082 (Am.)
Godber, J. T. (joint author), 191 (Def. Dis.)
Goddard, W. B. (joint author), 718 (Hel.)
Go Ing Gan (joint author), 223 (Oph.)
Goiny, H., Van Someren, E. C. C. & Heisch, R. B. 763 (Ent.)
Gold Coast, (1142) (Misc. Pap.)
Gold, T. (joint author), 712 (Hel.)
Goldberg, E., (1344) (Hel.)
Goldman, M., 1237 (Tox.)
—— (joint author), 492 *bis* (Misc. Dis.)
Goldstein, D. R. (joint author), 191 *ter* (Def. Dis.)
Goldstein, L. (joint author), (1081) (Am.)
Goldstein, R., 476 (Vms.)
Goldwein, M. I. (joint author), 1457 (Sp.)
Golinevich, E. M. (joint author), 667 (Typh.)
Gomberg, H. J. (joint author), 856 (Hel.)
Gomes, F. C. (joint author), 976 *bis* (Hel.)
Gómez, F., Ramos Galván, R., Cravioto, J. & Frenk, S., 1346 (Def. Dis.)
——, ——, ——, ——, De la Peña, C., Moreno, M. E. & Villa, M. E., 1453 (Def. Dis.)
——, ——, ——, ——, Janeway, C. A., Gamble, J. L. & Metcoff, J., 1451 (Def. Dis.)
——, ——, ——, ——, Vázquez Santaella, J. & De la Peña, C., 333 (Def. Dis.)
——, ——, Frenk, S., Cravioto Muñoz, J., Chávez, R. & Vázquez, J., 199 (Def. Dis.)
—— (joint author), (1346), 1451 (Def. Dis.)
Gómez Rodríguez, G., 506 (Lab.)
Gonçalves, M. M. (joint author), (1326) (Hel.)
Gonçalves, N. B. & Soares, R. de R. L., 312 *bis* (Hel.)
Goncharova, A. A., 231 (Parasit.)
Gondard, L., 293 (Am.)
Gönnert, R. & Mudrow-Reichenow, L., 687 (R.F.)
González, D. (joint author), 209 *bis* (Haem.)
Gonzalez, R. B., 898 (B.R.)
González Ochoa, A. & De Los Angeles Sandoval, M., 876 (Der.)
González Prendes, M. A., Mendieta Hechevarria, J. M. & Valhuerdi Fernández, C., 966 (Lep.)
Good, M. G., 1242 (Heat Str.)
Goodwin, L. G., 620 (Parasit.), 1414 (Am.)
Goodwin-Bailey, K. F., Holborn, J. M. & Davies, M., 1256 (Ent.)
Gopalan, C., 202, 1220 (Def. Dis.)
—— & Ramanathan, K. S., 860 (Def. Dis.)
—— (joint author), 861, 863, 1455 (Def. Dis.)
Gordillo, G., Soto, R. A., Metcoff, J., Lopez, E. & Garcia Antillon, L., (1346) (Def. Dis.)
—— (joint author), (1346) (Def. Dis.)
Gordon, G., 42 (Am.)
Gordon, I. (joint author), 419 (Den.)
Gordon, R. M., 325 (Hel.), 1263 (Reports, etc.)
——, Crewe, W. & Willett, K. C., 544 (Tryp.)
—— & Willett, K. C., 270 (Tryp.)
Gordon-Taylor, G., 365 (B.R.)
Gorecki, P., 1373 (Ent.), 1468 (Ulc.)
Gorrill, R. H. (joint author), 1315 (Chl.)
Gorvin, J. H., Raison, C. G., Solomon, W., Standen, O. D. & Walls, L. P., 1431 (Hel.)
Goto, N. (joint author), 1181 (Rab.)
Goto, T. (joint author), 87 (Oph.)
Gottlieb, A. & Kochman, R., 991 (Def. Dis.)
Gouck, H. K. (joint author .1250 (Ent.)
Gould, S. E., Gomberg, H. J. , Villella, J. B. & Hertz, C. S., 856 (Hel.)
Goulding, R., 178 (Lep.)
Gounelle, H., Demarchi, M., Rabii, H., Rashid, R., Findakly, S., Selloumi, H. F. & Cofman, S., 738 (Def. Dis.)
Goyal, R. K. & Sarin, J. C., 93 (Misc. Dis.)
Gözsy, B. (joint author), 1201 (Lep.)
Grace, W. J. (joint author), (874) (Vms.)
Graham, H. M. (joint author), 241 (Ent.)
Grailet, A. (joint author), 1450 (Def. Dis.)
Grainge, E. B. (joint author), 136 (Tryp.)
Gramiccia, G., 784 (Mal.)
Grandjean, L. C., 85 (Tox.)
Grant, P. T. & Fulton, J. D., 1163 (Tryp.)
—— (joint author), 542 (Tryp.)
Gras, G. (joint author), 301 (Hel.)
Gratz, N. G., Rosen, P. & Ascher, K. R. S., 1253 (Ent.)
Grayson, J. M. (joint author), (1141) (Ent.)
Green, N. M., (1213) (Hel.)
Greenberg, J., 14 (Mal.)
Greiff, D., Powers, E. L. & Pinkerton, H., 944 *bis* (Typh.)
Gremliza, F. G. L., 666 (Leish.)
Grenier, P., Adam, J. P. & Hamon, J., 96 (Ent.)
—— & Rageau, J., 678 (Pl.)
Greuel, D., 591 (Hel.)
Grewal, M. S., 937 (Tryp.)
Grieve, J. M. (joint author), 718 (Hel.)
Griffith, D. H. S., 1480 (Reports, etc.)
—— & Lim Swee Choo, 783 (Mal.)
Griffith, M. E. (joint author), 649 (Mal.)
Grimes, J. E. (joint author), 1177 (Rab.)
Grjebine, A., 919 (Mal.), (1247) (Ent.)
—— (joint author), 919 (Mal.)
Grobbelaar, B. G. (joint author), 993 (Def. Dis.)
Grober, J., 1008 (Heat Str.)
Grönroos, P., 607 (Tox.)
Grossowicz, N. (joint author), 866 (Haem.)
Grunberg, E. (joint author), 1031 (B.R.)
Grusin, H., 598 (Def. Dis.)
Gruzewski, A. (joint author), 801 (Typh.)
Gudoshnick, A. N. (joint author), 1267 (Reports, etc.)
Guha, A., Pyne, C. K. & Sen, B. B., 409 (Leish.)
Guha, A. C. (joint author), 567 (Chl.)
Guha, P. K., 860 (Def. Dis.)
Guicherit, I. D. (joint author), 1110 (Hel.)
Guillén (joint author), 701 (Lep.)
Guillory, R. L. (joint author), 191 *bis* (Def. Dis.)
Guimarães, F. N. (joint author), 1462 (Tox.)
Gujral, M. L. & Dhawan, B. N., 1002 (Vms.)
Gunaratna, L. F., 648 (Mal.)
Gunders, A. E. (joint author), 1292 (Mal.)
Gupta, N. P., Gupta, S. P., Mangalik, V. S., Prasad, B. G. & Yajnik, B. S., 425 (Chl.)
—— (joint author), 550 (Leish.)
Gupta, S. P. & Gupta, N. P., 550 (Leish.)
—— (joint author), 425 (Chl.)
Gurevitch, J. (joint author), 88 (Oph.)
Gurr, T., 635 (B.R.)
Gürsel, A., 582 (Hel.)
Gustina, F. J. (joint author), 76 (Hel.)
Gutfreund, R. (joint author), 668 (Typh.)
Guth, P. (joint author), (1222) (Def. Dis.)
Guthe, T. (joint author), 689 (Ys.)
Gutiérrez Ballesteros, E. (joint author), 821 (Am.)
Guttuso, C. & Lipparoni, E., 259 (Mal.)

Guzman, C. (joint author), 479 (Tox.)
György, P. (joint author), 1246 (Misc. Dis.)

H

Haast, W. E. & Winer, M. L., 214 (Vms.)
Habel, K., 1180 (Rab.)
Hacig, A. (joint author), 179 (Hel.)
Hackett, C. J., 46, 1417 (Ys.)
—— & Guthe, T., 689 (Ys.)
Hadaway, A. B., 1019 (Ent.)
—— & Barlow, F., 534 (Mal.)
—— (joint author), 632 (Ent.)
Haddow, A. J., 769 (Reports, etc.)
—— (joint author), 1072 (Den.)
Hadida, E. (joint author), (85) (Der.)
Hadji, A. (joint author), 28, 30 (Rab.)
Hadler, W. A. & Ziti, L. M., 55, 448, 835 (Lep.)
Hadlow, W. J. (joint author), 676 (Rab.)
Haffron, D. (joint author), 990 (Def. Dis.)
Hafström, T., 1005 (Tox.)
Hahndel, H. F. & Preger, L., 571 (Am.)
Haiba, M. H., 434 (Am.)
Halawani, A., 1425 (Hel.)
——, Abdallah, A. & Saif, M., 1097 (Hel.)
Halcrow, J. G., 1046 (Mal.)
Halde, C. & Ringrose, E. J., 221 (Der.)
Halff, L. A., 145 (Tryp.)
Halgeri, A. V. (joint author), 99 (Ent.)
Hall, B. & Carruthers, H. L., 683 (Am.)
Hall, W. J., 1261 (Reports, etc.)
Hallgren, B., (860) (Def. Dis.)
Halstead, B. W., 899 (B.R.)
Hamon, J., 761 (Ent.)
——, Adam, J. P. & Grjebine, A., 919 (Mal.)
——, Devémy, P., Rickenbach, A. & Causse, G., 760 (Ent.)
——, Rickenbach, A. & Robert, P., (761) (Ent.)
—— (joint author), 96, (241), (498) *bis* (Ent.)
Haneveld, G. T., 83 (Vms.)
Hanks, J. H., 296, 298, 439 *bis*, 1193 (Lep.)
—— & Fernandez, J. M. M., 178 (Lep.)
Hansen, J. D. L., 470 (Def. Dis.)
——, Howe, E. E. & Brock, J. F., 334 (Def. Dis.)
—— (joint author), 744 (Def. Dis.)
Hański, W. & Fermus, R., 1356 (Tox.)
Hanson, H. H. (joint author), 208 (Haem.)
Hanstein, H., 719 (Hel.)
Hara, K., 589 (Hel.)
—— (joint author), 454 (Hel.)
Harant, H., Bétoulières, P., Rioux, J. A. & Plane, J. (85) (Tox.)
——, Castel, P. & Gras, G., 301 (Hel.)
——, Rioux, J. A. & Jarry, D., 235 (Ent.)
—— (joint author), 404, 546 *bis* (Tryp.)
Harden-Smith, W. & Smith, M., 1421 (Lep.)
—— (joint author), 1421 (Lep.)
Hardy, A. V. (joint author), 1406 (Rab.)
Harrigan, R. E. (joint author), 1422 (Lep.)
Harris, J. E. & Crofton, H. D., (722) (Hel.)
Harrison, J. L., 1169 *bis* (Typh.)
Harry, H. W. & Cumbie, B. G., 308 *bis* (Hel.)
——, —— & Martinez de Jesus, J., 1325 (Hel.)
Hartmann, R. C. (joint author), 1348 (Haem.)
Hartwell, W. V. (joint author), 759 (Ent.)
Hartz, P. H., 233 (Parasit.)
Harvey, C. C. (joint author), 990 (Def. Dis.)
Harvey, M. S. (joint author), 413 (Typh.)
Haseeb, M. A. (joint author), 350 (Der.)
Haskins, W. T. & Weinstein, P. P., 856, 857 *bis* (Hel.)
Hasselmann, C. M., 295, 961 (Ys.)
Hathorn, M. (joint author), 1364 (Misc. Dis.)
Haubrich, W. S. & Wells, R. M., 1325 (Hel.)
Havlik, O. (joint author), 280 (Typh.)
Hawking, F. & Terry, R. J., 792 (Mal.)
—— (joint author), 592, 726, 1340 (Hel.)
Hawkins, W. B., 394 (Mal.)
Haworth, J. (joint author), 123 (Mal.)
Hayashi, Y. & Tachikawa, N., 442 (Lep.)
Hayashida, T., (1187) (Pl.)
Hazán, J. (joint author), 1439 (Hel.)
Hazzi, C. (joint author), 1202 (Hel.)
Heath, A. A. (joint author), 223 (Oph.)
Hedgcock, G. (joint author), 576 (Lep.)
Heimlich, C. R. (joint author), 185, 1212 (Hel.)
Heinemann, H. O. & Cheung, M. W., (1117) (Haem.)
Heinz, H. J., Brauns, W. & MacNab, G. M., 682 (Am.)
Heisch, R. B., 232 (Parasit.), 1068 (Typh.), 1167 (Leish.)
—— (joint author), 592, 763 (Hel.), 938 (Leish.)
Heller, P. (joint author), 1351 (Haem.)
Hellon, R. F., Jones, R. M., Macpherson, R. K. & Weiner, J. S., 227 (Heat Str.)
Helman, J., 1010 (Misc. Dis.)
Hemphill, E. C. (joint author), 325 (Hel.), 359 (Parasit.)
Henderson, H. E., 1440 (Hel.)
Hendricks, J. R. & Cort, W. W., 840 (Hel.)
Hennig, W. (joint author), 1380 (B.R.)
Henry, A. F. X., 1048 (Mal.)
Henry, B. S. (joint author), 611 (Der.)
Hensler, N. M. & Cleve, E. A., 352 (Der.)
Héraud, G. (joint author), (802) *bis*, (803) (Typh.)
Herrer, A., 271 (Tryp.), 1304 (Leish.)
Hertz, C. S. (joint author), 856 (Hel.)
Hervé, A. (joint author), 179, 181 (Hel.), 290 (Am.)
Hess, A. D. & Quinby, G. E., (502) (Ent.)
Heully, F. (joint author), (843) (Hel.)
Heuls, J. (joint author), 850 (Hel.)
Heuse, G. A., 997 (Haem.)
Heyberger, K. *et al.*, 1268 (Reports, etc.)
Hi, W. Y. (joint author), 177 (Lep.)
Hibi, H., 578 (Lep.)
Hicks, A., 1235 (Vms.)
Hiernaux, J. (joint author), 82 (Haem.)
Higdon, R. S., 480 (Der.)
Higgins, J. A., Lee, P. R., Scholer, J. F., Reitemeier, R. J., Code, C. F. & Wollaeger, E. E., 866 (Sp.)
Higginson, J., 1012 (Misc. Dis.)
——, Grobbelaar, B. G. & Walker, A. R. P., 993 (Def. Dis.)
Highman, B. (joint author), 141 (Tryp.)
Higuchi, K. & Carlin, C. E., 952 (Pl.)
Hilkovitz, G., 1350 (Haem.)
Hill, R. D., 189 (Hel.)
Hillers, A. (joint author), 309 (Hel.)
Hillier, J. (joint author), 209 (Haem.)
Hilson, G. R. F., (joint author), 447 (Lep.)
Himsworth, H. P., 1258 (Reports, etc.), 1419 (Lep.)
Hirano, N. & Sushida, K., 836 (Lep.)
Hiraoka T., 1357 (Tox.)
Ho, T. C. (joint author), 587 (Hel.)
Hoare, C. A., 1061 (Tryp.), 1414 (Am.)

Hocking, K. S. & Yeo, D., 543 (Tryp.)
Hodges, W. A. A., 54, 1421 (Lep.)
Hodgkin, E. P., 387 (Mal.)
Hoekenga, M. T., 591 (Hel.), 1083 (Am.)
Hoeppli, R., (850) (Hel.), (1015) (Parasit.)
Hoffmann, J. F., Wolman, I. J., Hillier, J. & Parpart, A. K., 209 (Haem.)
Hoffmann, R. A. & Yates, W. W., 762 (Ent.)
Holanda, D. (joint author), 1302 (Leish.)
Holborn, J. M. (joint author), 1256 (Ent.)
Holdenried, R. & Quan, S. F., 285 (Pl.)
Holderman, B. S. (joint author), 569 (Am.)
Holemans, K. & Lambrechts, A., 992 (Def. Dis.)
Hollander, W. F. (joint author), (267) (Mal.)
Holmes, E. G., 892 (Reports, etc.).
——, Jones, E. R., Lyle, M. D. & Stanier, M. W., 197 (Def. Dis.)
Holmes, E. N. C., 332 (Def. Dis.)
Holmes, M. McA., 1354 (Vms.)
Holstein, M., 1045 (Mal.)
—— (joint author), 919 (Mal.)
Honda, H. (joint author), 1193 (Lep.)
Hoogerheide, C. & Ensink, G. J., 669 (Typh.)
Hoogstraal, H., 899 (B.R.)
—— & Kaiser, M. N., 1026 *bis* (Ent.)
——, Wassif, K. & Kaiser, M. N., 1026 *bis* (Ent.)
—— (joint author), (769), 1026 (Ent.)
Hooper, A. D., 1357 (Tox.)
Hopkins, B. A. (joint author), 96 (Ent.)
Horan, R. V. (joint author), 1119 (Vms.)
Horie, N. (joint author), 669, 734 (Typh.)
Horikawa, T. (joint author), 152, 153 (Typh.)
Höring, F. O. & Höring, H., 1379 (B.R.)
Höring, H. (joint author), 1379 (B.R.)
Horjales, J. O. (joint author), 1439 (Hel.)
Hornbostel, H. (joint author), 1066 (Typh.)
Horns, H. L. (joint author), 121 (Mal.)
Horsfall, W. R. (joint author), 1019 (Ent.)
Horwitt, M. K., Harvey, C. C., Rothwell, W. S., Cutler, J. L. & Haffron, D., 990 (Def. Dis.)
Hoshino, M. & Suzuki, H., (323) (Hel.)
Hoskins, W. M. (joint author), 1252 (Ent.)
Hotta, S. & Evans, C. A., 282, 419 (Den.)
Hou, P. C., 62, 979 (Hel.)
Hou, T. C. (joint author), 317 (Hel.)
Houel, G., 780 (Mal.)
Houghtaling, D. G. (joint author), (973) (Hel.)
Hounié, P. & Artagaveytia-Allende, R. C., 1465 (Der.)
Howe, E. E. (joint author), 334 (Def. Dis.)
Hsieh, H. C. & Chuang, C. H., (1216) (Hel.)
—— & Liang, K. C., 783 (Mal.)
——, Tseng, P. T. & Chuang, C. H. 730 (Hel.)
Hsü, C. M. (joint author), 716 (Hel.)
Hsü, C. Y. (joint author), 716 (Hel.)
Hsü, H. F. & Ameel, D. J., 316 (Hel.)
—— & Hsü, S. Y. L., 314 (Hel.)
Hsu, J. (joint author), 66, (1323), 1338, (1343), 1443 (Hel.)
Hsü, S. Y. L. (joint author), 314 (Hel.)
Hsüeh, C. S. (joint author), 587 (Hel.)
Huang, M. H., Chiang, S. C., Lu, C. W., Yu, K. J., P'An, J. P., P'An, J. S. and Kuo, P. F., 1329 (Hel.)
—— (joint author), 716 (Hel.)
Huang, T. C. (joint author), 6 (Mal.)
Hubbard, J. A. (joint author), (985) (Hel.)
Hubbard, R. C. (joint author), 563 (Rab.)
Hubert, A. A. (joint author), 1370 (Ent.)
Hübner, O., 987 (Hel.)
Hucker, A. G. & Schofield, F. D., 189 (Hel.)
Hudson, B. N. A., 237 (Ent.)
Huehne, W. H., Hi, W. Y. & Schmidt, W., 177 (Lep.)
Huenemann, R. L., Bruch T., H.A. & Scholes, R. T., 1221 (Def. Dis.)
Huff, C. G., 1159 (Mal.)
Hugenholtz, P. G., 1242 (Der.)
Hughes, F. W. & Tatum, A. L., 536 (Mal.)
Hughes, M. H., (1142) (Misc. Pap.)
Hugon, J., 1010 (Misc. Dis.)
—— & Pieron, A., 1197 (Lep.)
Huisman, T. H. J., Noordhoek, K. & Da Costa, G. J., (605) (Haem.)
Hume, J. C. & Facio, G., 962 (Ys.)
Hungria, J. S., Jr. (joint author), 614 (Der.)
Hunninen, A. V. & Boone, H. A., 1413 (Am.)
Hunt, D. W. (joint author), 359 (Parasit.)
Hunter, G. W., Kemp, H. A., Smalley, H. E., Wilkins, O. P. & Dixon, C. F., 61 (Hel.)
——, Ritchie, L. S., Lin, S., Pan, C. & Tanabe, H., 457 (Hel.)
—— (joint author), 880 (Parasit.)
Huppert, M., 1359 (Der.)
Huriet, C. (joint author), (843) (Hel.)
Hurlbut, H. S. & Weitz, B., 498 (Ent.)
Hurst, E. W. (joint author), (1290) (Mal.)
Husain, M. M. S., 569 (Chl.)
Husain, M. Z. Y. & Talibi, S. A., 1047 (Mal.)
Husain, S. S. & Burrows, W., 426 (Chl.)
Husson, R. A. (joint author), 73 (Hel.), 1173 (Y.F.)
Hutchinson, M. P. (joint author), 540, 1295 (Tryp.)
Hyde-Wyatt, B., 1296 (Tryp.)
Hynes, M. & Lehmann, H., 747 (Haem.)
Hyodo, N. (joint author), 278 (Typh.)

I

Ibrahim, H., 1430 (Hel.)
Ignacio, J. L. (joint author), 1200 (Lep.)
Ihrig, J. (joint author), 1048 (Mal.)
Iida, H. (joint author), 277, 278 (Typh.)
Iimuro, I. (joint author), (277) (Typh.)
Ijima, Y. (joint author), 734 (Hel.)
Ilarshe, M. I., 1092 (Lep.)
Ilieş M. (joint author), 529 (Mal.)
Ilyashenko, L. I. (joint author), (926) (Mal.)
Inaizumi, T. (joint author), 847 (Hel.)
Ines Silva, I., 405 (Tryp.)
Inglese, F. (joint author), 1075 (Rab.)
Ingram, V. M., (80), (1348), (Haem.)
Innes, J. R., Smith, M. & Harden-Smith, W., 1421 (Lep.)
Inoki, S., Osaki, H. & Nakabayashi, T., 656 (Tryp.)
Institut pour la Recherche Scientifique en Afrique Centrale, 787 (Mal.)
International Congress of Nutrition, 190 (Def. Dis.)
Internat. Digest Health Legislation, 264 (Mal.)
Ionescu, D. (joint author), 148 (Leish.)
Iovanescu, F. (joint author), 148 (Leish.)
Irie, T. (joint author), 734 (Hel.)
Irons, J. V., Eads, R. B., Grimes, J. E. & Conklin, A., 1177 (Rab.)
Isaak, L. W. (joint author), (502), 1475 (Ent.)

Isasi, E. J. & Correa Durán, A., 935 (Tryp.)
Ishak, K. G., 1430 (Hel.)
——, Hazzi, C., Salib, M., Sabour, M. & Mahrous, A. R., 1202 (Hel.)
Istituto Superiore di Sanità, 504 (Ent.)
Itano, H. A. (joint author), 80 (Haem.)
Ito, J., (841) *bis* (Hel.)
—— & Inaizumi, T., 847 (Hel.)
Iturbe, J., 897 (B.R.)
Ivanov, V. A. (joint author), 814 (Pl.)
Ivinskis, V. (joint author), 861 (Def. Dis.)
Iyengar, M. O. T., 726, 1444 (Hel.)
—— & Menon, M. A. U., (500) (Ent.)
Iyengar, R., 325 (Hel.)
Iyer, S. N. (joint author), 681 (Chl.)
Izak, G., Rachmilewitz, M., Stein, Y., Berkovici, B., Sadovsky, A., Aronovitch, Y. & Grossowicz, N., 866 (Haem.)
Iziumova, N. A., 231 (Parasit.)
Izzo, G., 1301 (Leish.), 1439 (Hel.)

J

Jachowski, L. A., Jr., 1341 (Hel.)
Jackson, C. H. N. (joint author), (930) (Tryp.)
Jackson, E. B. (joint author), 411 (Typh.)
Jackson, F. C., 63 (Hel.)
Jackson, S. & Burrows, T. W., 565, 566 (Pl.)
Jacob, G. F., 870 (Haem.)
Jacobs, L., 477 (Tox.)
—— & Lunde, M. N., 1463, 1464 (Tox.)
Jacomo, R. (joint author), 1300 (Tryp.)
Jacquemin, P., 272 (Tryp.)
Jadhav, M. A. (joint author), 1452 (Def. Dis.)
Jaffe, R., 898 (B.R.)
Jaffurs, W. J. (joint author), 1339 (Hel.)
Jahn, E. & Roller-Gusinde, R. E., (625) (Parasit.)
Jakimowska, K. & Janowiec, M., 932 (Tryp.)
Jakowska, S. & Nigrelli, R. F., 476 (Tox.)
James, C. S., 112 (B.R.)
Jamison, D. G. & Kershaw, W. E., 731 (Hel.)
Janah, S., Bhowmik, D. N. & Chaudhuri, S. N., 497 (Parasit.)
Janeway, C. A. (joint author), (1346), 1451 (Def. Dis.)
Jankov, L. (joint author), 432 (Am.)
Janowiec, M. (joint author), 932 (Tryp.)
Jansen, G., 1380 (B.R.)
Janssen, P. & Van Bogaert, L., 402 (Tryp.)
Janssen, W. A. (joint author), 816 (Pl.)
Jardin, C. (joint author), 580, 832, 1089 (Lep.)
Jarniou, A. P. & Moreau, A., 1111 (Hel.)
Jarry, D. (joint author), 235 (Ent.)
Jarvis, F. E., Jr., Grayson, J. M. & Levitan, M., (1141) (Ent.)
Jaswant Singh, 245 (Lab.)
——, Basu, P. C. & David, A., (271) (Tryp.)
——, ——, Ray, A. P. & Nair, C. P., 131 (Mal.)
——, Krishnaswami, A. K. & Raghavan, N. G. S., 852 (Hel.)
——, ——, ——, Krishnamurthy, B. S. & Mammen, M. L., 464 (Hel.)
—— & Misra, B. G., 244 (Lab.)
——, Nair, C. P. & Ray, A. P., 11 (Mal.)
—— & Raghavan, N. G. S., (1112), 1446 (Hel.)
——, —— & Krishnaswami, A. K., 462 (Hel.)
——, Ray, A. P. & Nair, C. P., 11, 130 (Mal.)
Jayalakshmi, V. T., Ramanathan, M. K. & Gopalan, C., 1455 (Def. Dis.)
Jefferis, T. C., Consolazio, C. F. & Pollack, H., 191 (Def. Dis.)
Jeffery, G. M., 294 (Am.), 496 (Parasit.)
——, Young, M. D. & Eyles, D. E., 7 (Mal.)
Jeffries, W. B. (joint author), 331 (Hel.)
Jelesitsch, Z. (joint author), 812 (Rab.)
Jelinek, V. (joint author), 1268 (Reports, etc.)
Jelliffe, D. B., 467, 1449 (Def. Dis.)
——, Arroyave, G., Aguirre, F., Aguirre, A. & Scrimshaw, N. S., 196 (Def. Dis.)
Jellison, W. L., 478 (Tox.)
——, Fullerton, W. J. & Parker, H., 478 (Tox.)
—— (joint author), 676 (Rab.)
Jemesen, M. T. (joint author), 1045 (Mal.)
Jenkins, A. R. & Grainge, E. B., 136 (Tryp.)
Jenkins, H. G., 389 (Mal.)
Jenkins, M. E., 1343 (Hel..)
——, Scott, R. B. & Ferguson, A. D., 341 (Haem.)
Jennings, F. W., Mulligan, W. & Urquhart, G. M., 182 (Hel.)
Jennings, W. L. (joint author), 1406 (Rab.)
Jensen, W. N., Schoefield, R. A. & Agner, R., 605 (Haem.)
Jewell, G. R., 138 (Tryp.)
Jeziorańska, A. & Dobrowolska, H., 985 (Hel.)
Jhala, H. I. (joint author), 84 (Tox.)
Jhaveri, C. L. (joint author), 1117 (Haem.)
Jiménez García, R., (985) (Hel.)
Jindal, M. N., (392) (Mal.)
Jírovec, O., (1368) (Parasit.), (1462) (Tox.)
Johns, D. L. (joint author), 1395 (Tryp.)
Jolivet, P. (joint author), 1052 (Mal.)
Jolliffe, N. & Tung, T. C., 201 (Def. Dis.)
Jolly, S. S. (joint author), 844 (Hel.)
Jomini, P. (joint author), 979 (Hel.)
Joncour, G., 779 (Mal.)
Jones, E. B., 197 (Def. Dis.)
Jones, E. R. (joint author), 197 (Def. Dis.)
Jones, H. L. (joint author), (1082) (Am.)
Jones, J. C., 1156 (Mal.)
Jones, P. R. M. & Dean, R. F. A., 203 (Def. Dis.)
Jones, R. M. (joint author), 227 (Heat Str.)
Jonsson, S. (joint author), 818 (Am.)
Jonxis, J. H. P., 338, (474) (Haem.)
Jopling, W. H., 53, 440 (Lep.)
—— & Cochrane, R. G., 443 (Lep.)
Jordan, K., 512 (B.R.)
Jordan, P., 729 (Hel.)
Jörg, M. E., 798 (Tryp.)
Josephson, A. M. (joint author), 1351 (Haem.)
Joshi, J. G. (joint author), 884 (Ent.)
Josiah Macy Jr. Foundation, 1456 (Def. Dis.)
J. Trop. Med. & Hyg., 956 (Ys.)
Jove, J. A., 60 (Hel.)
—— & Marszewski, P., 897 (B.R.)
Juarez, E., 574 (R.F.)
Judd, J. M. (joint author), (143) *bis*, (932) (Tryp.)
Juergens, J. L., Scholz, D. A. & Wollaeger, E. E., 471 (Sp.)
Juillan, M. (joint author), 917 (Mal.)
Jung, R. (joint author), 1002 (Vms.)
Jung, R. C., Emerson, S. M. & Sewell, B., 331 (Hel.)
—— & Faust, E. C., 233 (Parasit.)
—— (joint author), 685, 686 (Am.)
Jurkovsky, A. M., 812 (Rab.)
Jusatz, H. J. (joint author), 1379 (B.R.)

K

Kabler, P. W. (joint author), 288 (Am.)
Kachroo, P. (joint author), 261, (387) (Mal.)
Kagan, I. G. & Meranze, D. R., 1208 (Hel.)
Kahn, E. & Falcke, H. C., 78 (Def. Dis.)
——, Stein, H. & Zoutendyk, A., 600 (Def. Dis.)
Kaipainen, W. J. & Ohela, K., 1333 (Hel.)
Kaiser, E., 899 (B.R.)
Kaiser, M. N. (joint author), 1026 *quat.* (Ent.)
Kakoti, L. M. & Dey, N. C., (484), 1125 (Der.)
Kalbe, I., 622 (Parasit.)
Kalmykov, N. L. (joint author), 155, 559 (Typh.)
Kalra, N. L. (joint author), (1135) (Ent.)
Kamo, H., (99) (Ent.)
Kaneko, T. (joint author), 356 (Oph.)
Kano, R. & Morikawa, T., (1254) (Ent.)
—— & Okazaki, T., (99) (Ent.)
Kant, L., Sen, S. K. & Puri, B. S., 462 (Hel.)
Kao, H. M. (joint author), 323 (Hel.)
Karazeeva, Z. F. (joint author), 231 (Parasit.)
Kartasheva, A. L. (joint author), 1410 (Pl.)
Kartman, L. & Prince, F. M., 678 (Pl.)
——, —— & Quan, S. F., 32 (Pl.)
——, Quan, S. F. & McManus, A. G., 284 (Pl.)
Karulin, B. E. (joint author), 553 (Typh.)
Kasii, T. (joint author), 87 (Oph.)
Kasliwal, R. M. & Bhatia, M. L., 42 (Am.)
Kasprzak, W. (joint author), 756 (Parasit.)
Katalinic, V. (joint author), 479 (Tox.)
Kátó, L. & Gözsy, B., 1201 (Lep.)
Katsura, S., Katsuta, K. & Aoike, T., 804 (Typh.)
—— *et al.*, 803 (Typh.)
Katsuta, K. (joint author), 804 (Typh.)
Kaufman, B. D. (joint author), 1457 (Sp.)
Kaufman, S. F. (joint author), (869) (Haem.)
Kauker, E. (joint author), 1380 (B.R.)
Kawamura, A., Jr. (joint author), 277 (Typh.)
Kearns, C. W. (joint author), 362, 764 (Ent.)
Kechker, A. S., 573 (Am.)
Keegan, H. L., 899 (B.R.)
Keen, R. (joint author), 1351 (Haem.)
Keitel, H. G., Thompson, D. & Itano, H. A., 80 (Haem.)
—— (joint author), 80 (Haem.)
Kekre, M. S. (joint author), 186 (Hel.)
Keller, J. C., Wilson, H. G. & Smith, C. N., 504 (Ent.)
Kellett, F. R. S. (joint author), 159 (Y.F.)
Kellina, O. I., 551 (Leish.)
Kemp, H. A. (joint author), 61 (Hel.)
Kendall, S. B., 620 (Parasit.)
Kenney, R. A., 1143 (Misc. Pap.)
—— & Watkins, E. S., 89 (Heat Str.)
Kent, J. F., Otero, A. G. & Harrigan, R. E., 1422 (Lep.)
—— (joint author), 548 (Tryp.)
Kerbabaev, E. B. (joint author), 555 (Typh.)
Kerbastard, P., 966 (Lep.)
—— (joint author), 580, 832, 1089 (Lep.)
Kerdel, F. (joint author), 1398 (Leish.)
Kermack, W. O. (joint author), 793 (Mal.)
Kerner, M. W. (joint author), 953 (Am.)
Kerrest, J. (joint author), 728 (Hel.)
Kershaw, W. E., 106 (Reports, etc.)
——, Deegan, T., Moore, P. J. & Williams, P., 853 (Hel.)
——, Plackett, R. L., Moore, P. J. & Williams, P., 1113 (Hel.)
Kershaw, W. E., St. Hill, C. A., Semple, A. B. & Davies, J. B. M., 735 (Hel.)
—— (joint author), 731 (Hel.)
Kessel, J. F. (joint author), 728, 850 (Hel.)
Kessler, J. (joint author), 170 (Am.)
Kettle, D. S., (1020) (Ent.)
——, Nash, R. H. & Hopkins, B. A., 96 (Ent.)
—— & Parish, R. H., 1370 (Ent.)
Khairy, M., 1431 (Hel.)
Khalap, N. V., 202 (Def. Dis.)
Khan, M. A., 1136 (Ent.)
Khanolkar, V. R. (joint author), 51 (Lep.)
Kharlamovich, S. I., 1267 (Reports, etc.)
Khatri, L. D., 790 (Mal.)
Kho Lien-Keng, 744 (Def. Dis.)
——, Poesponegoro, S. D. & Poey Seng Hin, 992 (Def. Dis.)
Khramelashvil, N. G., (1445) (Hel.)
Khurana, B. S., Bhatia, M. L. & Sharma, M. I. D., 1070 (Y.F.)
Kikuchi, H., 721 (Hel.)
Kilpatrick, J. W. & Schoof, H. F., 98, 765, 1137 (Ent.)
—— (joint author), 765 (Ent.)
Kingazi, H. (joint author), 1155 (Mal.)
Kingery, F. A. J. (joint author), 461 (Hel.)
Kingscote, A. A. (joint author), (989) (Hel.)
Kinnear, A. A., (245) (Lab.), 1198 (Lep.)
—— & Pretorius, P. J., 743 (Def. Dis.)
Kireeva, R. Y., 412 (Typh.)
Kirk, R., 149, 1065 (Leish.), 1365 (Misc. Dis.)
Kissaun, A. M. (joint author), 831 (Lep.)
Kitamura, K. & Nishiura, M., 51 (Lep.)
Kitaoka, M. (joint author), 1073, 1074 (Rab.)
Kitze, L. K., 1401 (Typh.)
Kivits, M., 177 (Lep.)
Klein, R. M. (joint author), 262, 1385 (Mal.)
Klock, J. W., 59 (Hel.)
Klokke, A. H., 173 (Ys.)
Kluth, F. C., 297 (Lep.)
Kmety, E. (joint author), 1268 (Reports, etc.)
Knipe, F. W., (891), 1256 (Ent.)
Knipling, E. B. & Sullivan, W. N., 1475 (Ent.)
Knox, R., 620 (Parasit.)
Koang, N. K., Tung, T. C., Tch'en, K. L. & Hsüeh, C. S., 587 (Hel.)
Kobayashi, S., Araki, A. & Sagae, K., 877 (Oph.)
——, Tashima, H., Tanaka, K. & Uyeno, H., 1361 (Oph.)
Koberle, F., 935 (Tryp.)
—— & Nador, E., 147 (Tryp.)
Kochman, R. (joint author), 991 (Def. Dis.)
Kochwa, S. (joint author), 873 (Vms.)
Kocijančič, K., (474) (Haem.)
Kołłoto, B., 800 (Typh.)
Kolotygina, A. P. (joint author), 153 (Typh.)
Kolpakova, S. A. (joint author), 231 (Parasit.)
Komiya, Y., Yasuraoka, K. & Sato, A., 1109 (Hel.)
Kondi, A. (joint author), 79, 1457 (Haem.)
Kondo, A. (joint author), 1073, 1074 (Rab.)
Kony, M., 1361 (Oph.)
Kooij, R. & Gerritsen, T., 577 (Lep.)
Koppisch, E. (joint author), 435 (Am.), 714 (Hel.)
Kornblueth, W., Feigenbaum, A. & Bernkopf, H., 615 (Oph.)
Korolev, P. A. & Kolotygina, A. P., 153 (Typh.)
Korovai, A. F. (joint author), (926) (Mal.)

Kostrzewski, J., 551 (Typh.)
——, Gruzewski, A. & Milewska, L., 801 (Typh.)
Kothari, B. V. (joint author), 1117 (Haem.)
Koumans, A. K. J., 1141 (Ent.)
Koźmińska, A. (joint author), 1171 (Typh.)
Kraan, H., 122 (Mal.)
—— (joint author), 1050 (Mal.)
Kramberger, V. (joint author), 95 (Parasit.)
Kranendonk, O., 437 (Ys.)
Kraneveld, F. C. & Mansjoer, M., (1298) (Tryp.)
Kraus, C., (798) (Tryp.)
Krause, W. W., 950 (Rab.)
Kreis, B., (1014) (Misc. Dis.)
Krishna Murti, C. R. (joint author), 681 (Chl.)
Krishnamurthy, B. S. (joint author), 464 (Hel.), (1054), (1292) (Mal.)
Krishnan, K. S. (joint author), 1047 (Mal.)
Krishnaswami, A. K. (joint author), (327), 462, 464, 852 (Hel.)
Krümmel, H., 430 (Am.)
—— & Brauns, A., 1023 (Ent.)
Krupp, I. M., 572 (Am.)
Krystanek, E. (joint author), 503 (Ent.)
Kuan-Wei-Bin, 1293 (Mal.)
Kuar, B. (joint author), 434 (Am.)
Kulagin, S. M. & Silich, V. A., 555 (Typh.)
Kulesza, J. & Krystanek, E., 503 (Ent.)
Kulkarni, B. S. (joint author), 77 (Def. Dis.)
Kuma, N. (joint author), 1073, 1074 (Rab.)
Kumar, A., Agarwal, K. L., Kumar, S. & Mangalik, V. S., 1375 (Misc. Pap.)
Kumar, S. (joint author), 1375 (Misc. Pap.)
Kunert, H. & Werner, H., 1056 (Mal.)
Kuntz, R. E. (joint author), 624 (Parasit.)
Kuo, P. F. (joint author), 1329 (Hel.)
Kuper, S. W. A., 1420 (Lep.)
Kurzeja, K. (joint author), 807 *bis* (Typh.)
Kuźmicki, R. (joint author), 573 (Am.)

L

Laarman, J. J., 346 (Tox.)
Labegorre, J. (joint author), (1355) (Vms.)
Labusquière, R., 1085 (Ys.)
Lacan, A., 1382 (Mal.)
Lacaz, C. da S. & Fava Netto, C., 86 (Der.)
—— (joint author), 879 (Misc. Dis.)
Lacerda, N. B. (joint author), 1340 (Hel.)
Lachance, F. (joint author), 779 (Mal.)
Lacour, 447 (Lep.)
Lacour, M. (joint author), 436 (Ys.)
Ladell, W. S. S., 1242 *bis* (Heat Str.)
La Face, L., (393) (Mal.)
Lagrange, E., 307 (Hel.)
Lagraulet, J. (joint author), 328 (Hel.)
Laha, P. N., 421 (Rab.)
Lahiri, S. C., Basu, S. N., Lahiri, S. C., Jr. & Ghorai, P. C., 817 (Chl.)
—— & Guha, A. C., 567 (Chl.)
Lahiri, S. C., Jr. (joint author), 817 (Chl.)
Lahon, H. (joint author), 1376 (Misc. Pap.)
Laing, A. B. G., 119 (Mal.)
Laing, W. N. (joint author), 1231 (Haem.)
Lainson, R., 1121 (Tox.)
—— (joint author), 1292 (Mal.)
Laird, M., 507 (Misc. Pap.)
Lal, S. B., 467 (Def. Dis.)
—— & Roychowdhury, S. P., (1449) (Def. Dis.)
Lambotte, C. (joint author), 658 (Tryp.)
Lambrecht, F. L. (joint author), 139 *bis*, 141 (Tryp.)
Lambrechts, A. (joint author), 992 (Def. Dis.)
Lammers, T. F. M. (joint author), 1363 (Heat Str.)
Lämmler, G., 319 (Hel.)
Lamont, N. McE. (joint author), 1364 (Misc. Dis.)
Lamy, H. (joint author), 1101 (Hel.)
Lamy, L., (571) (Am.)
—— & Molinari, V., 41 (Am.)
Landau, J. (joint author), 88 (Oph.)
Landquist, J. K., 1414 (Am.)
Lang, C. A., 500 (Ent.)
—— & Wallis, R. C., 500 (Ent.)
—— (joint author), (763) (Ent.)
Langbridge, D. M., 123 (Mal.)
Lange, R. D. (joint author), 873 (Haem.)
Langinieux, J. (joint author), 330 (Hel.)
Langsjoen, P. H., 275 (Leish.)
Languillon, J., 10 (Mal.)
——, Mouchet, J., Rivola, E. & Rateau, J. 4 (Mal.)
—— (joint author), 670, (1069) (Typh.), 1386 (Mal.)
Lankford, C. E. (joint author), 1077 (Chl.)
Lanzo, A., 364 (Lab.)
—— (joint author), 738 (Def. Dis.)
Lapage, G., 771 (B.R.)
Lapenta, P. (joint author), 1196 (Lep.)
Lapierre, J., (467) (Hel.)
Lara, C. B. & Nolasco, J. O., 829 (Lep.)
——, Palafox, C. A., Ignacio, J. L. & Nolasco J. O., 1200 (Lep.)
Laranja, F. S., Dias, E., Nobrega, G. & Miranda A., 660 (Tryp.)
Larcan, A. (joint author), (843) (Hel.)
Larghero Ybarz, P., (984) (Hel.)
Lariviere. M., 1297 (Tryp.)
—— & Abonnenc, E., (361) (Ent.)
—— (joint author), 1140 (Ent.)
Larsh, J. E., Jr., Race, G. J. & Jeffries, W. B. 331 (Hel.)
La Rue, G. R., (1106) (Hel.)
Lass, N. & Nitzani (Genazzani), C., 719 (Hel.)
Lassance, M., Peeters, E. & Grailet, A., 1450 (Def. Dis.)
Laubscher, H. H., 751 (Vms.)
Laurent, G. (joint author), (475) (Haem.)
Laurent, J. (joint author), 625 (Ent.)
Lauret, L., Laviron, P., Kerbastard, P. & Jardin C., 580 (Lep.)
—— (joint author), 832, 1089 (Lep.)
Laurie, W. (joint author), 183 (Hel.)
Lavier, G., (837) (Hel.)
—— & Deschiens, R., 318 (Hel.)
——, Lagraulet, J. & D'Haussy, R., 328 (Hel.)
Laviron, P., Lauret, L., Kerbastard, P. & Jardin C., 832, 1089 (Lep.)
—— (joint author), 580 (Lep.)
Lavrenko, E. M. (joint author), (926) (Mal.)
Lawless, D. K., Kuntz, R. E. & Strome, C. P. A., 624 (Parasit.)
Lawley, B. J., 669 (Typh.)
Lawton, A. H., Dexter, M. W. & Warren, L. O., 1140 (Ent.)
Lawton, W. D. (joint author), 816 (Pl.)
Layrisse, M. (joint author), 1336 (Hel.)
Lazar, H. P., 339 (Haem.)

Lea, A. O. (joint author), 885 (Ent.)
Lebrun, A., 770 (Reports, etc.)
Lecaldano, E. (joint author), 806 (Typh.)
Lechat, M. (joint author), 702 (Lep.)
Lechin, F., 898 (B.R.)
Leclerc, H. & Sureau, P., 879 (Misc. Dis.)
Leclercq, M., (1254) (Ent.)
Lee, C. L. (joint author), 451 (Hel.)
Lee, P. R. (joint author), 866 (Sp.)
Lee, T. S. (joint author), 471 (Haem.)
Lees, F. (joint author), 859 (Def. Dis.)
Leffkowitz, M. (joint author), 873 (Vms.)
Le Filliatre, M. (joint author), 933 (Tryp.)
Lefrou, G. & Michard, V., 751 (Vms.)
Le Gac, P. (joint author), 156 (Typh.)
Legrand, J., Evens, F. & Lambotte, C., 658 (Tryp.)
Le Henand, F., 267 (Bl.)
Lehmann, E. E. (joint author), 170 (Am.)
Lehmann, H., 745 (Haem.)
—— & Raper, A. B., 339 (Haem.)
—— & Singh, R. B., 212 (Haem.)
——, Story, P. & Thein, H., 1001 (Haem.)
—— (joint author), 211, 603, 747, 1000, 1118 *bis*, 1229, 1232, 1233, 1234 (Haem.)
Leiker, D. L., 1199 (Lep.)
Leikin, S. L., 1232 (Haem.)
Leithead, C. S., 1242 (Heat Str.)
Lejeune, P., 1469 (Ulc.)
Lelièvre, A. (joint author), (802) *bis*, (803) (Typh.)
Lemaire, R., Pille, G. & Ducros, H., 616 (Heat Str.)
LeMaistre, C. A., Sappenfield, R., Culbertson, C., Carter, F. R. N., Offutt, A., Black, H. & Brooke, M. M., 39 (Am.)
Le Muet, G., 486 (Misc. Dis.)
Lenzerini, L. (joint author), 1470 (Misc. Dis.)
Leon, L. A., 822 (Am.)
Leon Moreno, A. (joint author), 173 (Am.)
Lepissier, H. (joint author), 1184 (Rab.)
Le Roux, J. G. (joint author), 1296 (Tryp.)
Leshchinskaiia, E. V., Povalishina, T. P. & Dzagurov, S. G., (1171) (Typh.)
Lesser, E., 495 (Parasit.)
—— & Lukeman, J. M., 936 (Tryp.)
Letichvskaia, A., 1421 (Lep.)
Levenson, S. M. (joint author), 1076 (Pl.)
Levin, S. (joint author), (340) (Haem.)
Levine, H. B. (joint author), (230), (1134) (Misc. Dis.)
Levinson, Z. H. & Bergmann, E. D., 628 (Ent.)
—— (joint author), 886 (Ent.)
Levitan, M. (joint author), (1141) (Ent.)
Levitanskaya, P. B. (joint author), 642 (Mal.)
Levron, M. (joint author), 403, (932) (Tryp.)
Lewert, R. M. & Lee, C. L., 451 (Hel.)
Lewińska, Z. (joint author), 807 *bis*, 808, 1167 (Typh.)
Lewis, A. L. (joint author), 1406 (Rab.)
Lewis, D. J., 75 (Hel.), 118 (Mal.), 235, 499 *bis*, 883, (1020) (Ent.)
Lewis, O. H. (joint author), 191 (Def. Dis.)
Lewis, R. A., Bhagat, M. P., Wagle, M. M., Kulkarni, B. S. & Satoskar, R. S., 77 (Def. Dis.)
—— (joint author), 186 (Hel.), 617 (Misc. Dis.), 822, (Am.), 1353 (Vms.)
Lewis, S. E. & Fowler, K. S., (239) (Ent.)
Lewis, S. M., Anderson, C. G. & Baskind, E., 746 (Haem.)
L'Hoiry (joint author), 850 (Hel.)
Li, J. (joint author), 181 (Hel.)
Liang, K. C. (joint author), 650, 783 (Mal.)
Liang, S. F., Wang, H. C., Wang, T. H. & Liu, M. F., 1213 (Hel.)
Liang, Y. I., Chu, C. C., Chih, C. C., Tsen, Y. L. & Ting, K. S., 455 (Hel.)
——, ——, Tsen, Y. L. & Ting, K. S., 1208 (Hel.)
—— —, Tsen, Y. L., Chu, C. C. & Ting, K. S., 1208 (Hel.)
—— (joint author), 455, 456, 1207 (Hel.)
Lichtenberg, F. (joint author), 314 (Hel.)
Lieberman, A. H. (joint author), 838 (Hel.)
Lie-Injo Luan Eng, 604 (Haem.)
—— & Oey Hoey Giok, (475) (Haem.)
—— (joint author), 1233 (Haem.)
Lien, J. C. (joint author), 1373 (Ent.)
Lienk, S. (joint author), (502) (Ent.)
Lieske, H. (joint author), 948 (Y.F.)
Lieutaud, A. (joint author), 784 (Mal.), (1018) (Ent.)
Lightwood, R., 109 (B.R.)
Likar, M., 280 (Typh.)
—— (joint author), 95 (Parasit.)
Lim, D. (joint author), 280 (Typh.)
Lim Swee Choo (joint author), 783 (Mal.)
Lima, H. M. de A. (joint author), 798 (Tryp.)
Lima Gomez, O., 898 (B.R.)
Limbos, P. (joint author), 408 (Leish.)
Lin, S. (joint author), 457 (Hel.)
Lin, S. S. (joint author), 232, 880 (Parasit.), 315 (Hel.)
Lindberg, R. B. (joint author), 1076 (Pl.)
Lindquist, A. W., 1021 (Ent.)
Lindquist, D. A. & Fay, R. W., 239 (Ent.)
Linhard, J., 601 (Haem.)
——, Mazaud, R. & Moissinac, J., 1347 (Haem.)
—— (joint author), 82 (Haem.)
Linhartová, A., 360 (Parasit.)
Linnell, W. H. (joint author), (1416) (Am.)
Lipparoni, E., 487 (Misc. Dis.)
—— (joint author), 259 (Mal.)
Lippi, M., (1107) (Hel.)
Lips, M. & Rodhain, J., (620) (Parasit.)
—— (joint author), (498) (Ent.)
Lira, O. de A., Ramos e Silva, J. & De Almeida, A. P., 1086 (Lep.)
Liu, H. H. (joint author), 323 (Hel.)
Liu, J. C. (joint author), (1323), 1338, (1343) (Hel.)
Liu, M. F. (joint author), 1213 (Hel.)
Livadas, G. A., (1292) (Mal.)
—— & Thymakis, K., 919 (Mal.)
Livett, B. H. (joint author), 1222 (Def. Dis.)
Livingstone, F. B., 785 (Mal.)
—— (joint author), 82 (Haem.)
Lizano, C. (joint author), 985 (Hel.)
Lobitz, W. C., Jr. (joint author), 1244 (Heat Str.)
Loddo, B. & Piras, L., 763 (Ent.)
Loeffler, R. K. (joint author), 208 (Haem.)
London, I. D., 350 (Der.)
Loomis, R. B., (99) (Ent.)
Lopatukhina, L. G. (joint author), 1410 (Pl.)
Lopez, E. (joint author), (1346) (Def. Dis.)
López Narváez, G., (46) (Ys.)
López Rico, A., Loyo Díaz, C. & Retaloza Díaz, T., 847 (Hel.)
Loran, M. R., Kerner, M. W. & Anderson, H. H., 953 (Am.)

Lo Siauw Koen (joint author), 223 (Oph.)
Loughlin, E. H. & Mullin, W. G., 171 (Am.)
Louw, J. H. & Wilkie, W., 458 (Hel.)
Love, G. J. & Smith, W. W., 1017 (Ent.)
—— (joint author), 761 (Ent.)
Lowe, J. & Davey, T. F., 1194 (Lep.)
—— & McFadzean, J. A., 49 (Lep.)
Lowenthal, J. P., 287 (Chl.)
Lowy, L., 577 (Lep.)
Loyo Díaz, C. (joint author), 847 (Hel.)
Lozano Morales, A., 646, (925) (Mal.)
Lu, C. W. (joint author), 716, 1329 (Hel.)
Lubinsky, G., 466 (Hel.)
Lucker, J. T. & Foster, A. O., (1368) (Parasit.)
Luckner, H. & Magun, R., 600 (Def. Dis.)
Ludford, C. G. & Cook, I., 1068 (Typh.)
Ludwig, H., 24 (Typh.)
Łukasiak, J., 386, 1286 (Mal.)
Lukeman, J. M. (joint author), 936 (Tryp.)
Lunde, M. N. (joint author), 1463, 1464 (Tox.)
Luoto, L., 416 (Typh.)
Lupaşcu, G., Duport, M., Cristescu, A., Mănoiu, C. & Raicu, V., 1398 (Leish.)
Luppi, A. (joint author), 1211 (Hel.)
Lupulescu, V. (joint author), 148 (Leish.)
Lurie, H. I. & De Meillon, B., 1101 (Hel.)
Lusby, M. (joint author), (1134) (Misc. Dis.)
Lutyński, R., Raginis, Z., Ziemichód, T. & Koźmińska, A., 1171 (Typh.)
—— (joint author), 1307 (Typh.)
Luyken, R. (joint author), 991 (Def. Dis.)
Lyle, M. D. (joint author), 197 (Def. Dis.)
Lysenko, A. I., 924 (Mal.)
——, Lavrenko, E. M., Ilyashenko, L. I. & Korovai, A. F., (926) (Mal.)
Lysenko, M. G. (joint author), 823 (Am.)
Lyu, K. L. (joint author), 978 (Hel.)

M

Maaløe, O., 1353 (Vms.)
Mabille, E. (joint author), (431) (Am.)
MacArthur, W., 1190 (R.F.)
McCamish, J. (joint author), 1410 (Pl.)
McCarthy, D. D., 101 (Reports, etc.), 1437 (Hel.)
Macchiavello, A., 1407 (Pl.)
McClelland, W. F. J., 1094 (Hel.)
McConnachie, E. W., 165 (Am.)
McCourt, J. F. (joint author), 826 (Ys.)
McCown, J. M. (joint author), 216 (Tox.)
McCullough, F. S., 301 (Hel.)
McDaniel, I. N. & Horsfall, W. R., 1019 (Ent.)
Macdonald, G., 106 (Reports, etc.), 767 (Ent.), 778, 918, 1388 (Mal.)
Macdonald, W. W., 560 *bis* (Y.F.)
Macedo, D. G. (joint author), 1328, 1428, 1429 (Hel.)
McFadzean, A. J. S. & Tsang, K. C., 229 (Misc. Dis.)
McFadzeăn, J. A. & Hawking, F., 726 (Hel.)
——, McCourt, J. F. & Wilkinson, A. E., 826 (Ys.)
—— (joint author), 49 (Lep.), 986 (Hel.)
MacFarlane, W. V., 89 (Heat Str.)
McGhee, R. B., 14, 1057 (Mal.)
MacGregor, H., 828 (Lep.)
McGregor, I. A., Gilles, H. M., Walters, J. H., Davies, A. H. & Pearson, F. A., 389 (Mal.)
—— (joint author), 527 (Mal.), 602 (Haem.)
McGuire, C. D. & Durant, R. C., 1360 (Oph.)
MacIver, J. E. (joint author), 869 (Haem.)
Mackerras, I. M., (629) (Ent.)
McKibben, J. W. (joint author), 362 (Ent.)
McKiel, J. A., 1018 (Ent.)
McKinnon, J. A., 844 (Hel.)
—— & Fendall, N. R. E., 17 (Leish.)
McLeod, W. S. (joint author), (1138) (Ent.)
McLetchie, J. L., 956 (Ys.)
McManus, A. G. (joint author), 284 (Pl.)
McMurry, T. B. H. (joint author), 324 (Hel.)
MacNab, G. M. (joint author), 682 (Am.)
McPhee, W. R., 619 (Misc. Dis.)
Macpherson, R. K., 224 (Heat Str.)
—— (joint author), 227 (Heat Str.)
McQuay, R. M., Jr., 570, 1413 (Am.)
McRobert, G., 106 (Reports, etc.)
McSorley, J. G. A. (joint author), 1118 (Haem.)
Maddy, K. T. (joint author), 354 (Der.)
Maegraith, B. G., 920 (Mal.)
Maffei, W. E. & Hungria, J. S., Jr., 614 (Der.)
Magalhães, A., Jr., 1427 (Hel.)
Magalhães Neto, B. & De Almeida, A. M., 709 (Hel.)
—— & De Moraes, J. G., 709, 714 (Hel.)
Maggi, N., 1183 (Rab.)
Magun, R. (joint author), 600 (Def. Dis.)
Mahrous, A. R. (joint author), 1202 (Hel.)
Maillot, L., 657 (Tryp.)
Mailloux, M. (joint author), 700, 701 (Lep.)
Makar, N., 365 (B.R.)
Malága-Alba, A., 948 (Rab.)
—— & Campillo Sainz, C., 1177 (Rab.)
—— (joint author), (1073) (Rab.)
Malaya, Federation of, 117 (Mal.)
Maldonado, J. F., 300 (Hel.)
Maldonado Sampedro, M. & De Vera Andrey, R., 955 (R.F.)
Mammen, M. L. (joint author), 464 (Hel.), 1287 (Mal.)
Mandoul, R., Hadida, E. & Sabatier, J., (85) (Der.)
Mangalik, V. S. (joint author), 425 (Chl.), 1375 (Misc. Pap.)
Mankau, S. K., 460, 1107 (Hel.)
Manning, J. D. & Reid, J. D., 1123 (Tox.)
—— (joint author), 753 (Tox.)
Manoiu, C. (joint author), 1398 (Leish.)
Mansjoer, M. (joint author), (1298) (Tryp.)
Manson-Bahr, P. [H.], 100 (Misc. Pap.), 995 (Sp.), 1009 *bis* (Misc. Dis.), 1378 (B.R.), 1460 (Vms.)
—— & Muggleton, W. J., 819 (Am.)
Manson-Bahr, P. E. C. & Heisch, R. B., 938 (Leish.)
Mansour, J. M. (joint author), (1100) (Hel.)
Manuwa, S. L. A., 1257 (Misc. Pap.)
Mao, S. P. & Lyu, K. L., 978 (Hel.)
Maraini, G. (joint author), 1230 (Haem.)
Maranzana, A. (joint author), 16 (Leish.)
Marculescu, T. (joint author), 479 (Tox.)
Maretić, Z., 1354 (Vms.)
Margolis, J., 1125 (Der.)
Mariani, M., 122 (Mal.)
Marie-Suzanne (joint author), 835 (Lep.)
Marigo, C. (joint author), (587) (Hel.)
Marill, F. G., 58, 1424 (Hel.)
Markham, F. S., 477 (Tox.)
Markos, B. G. & Sherman, E. J., (1018) (Ent.)
Marks, C., 303, (971) (Hel.)

Marks, E. N., 1136 (Ent.)
Marks, E. P. (joint author), (502) (Ent.)
Marmion, B. P. & Harvey, M. S., 413 (Typh.)
— & Stoker, M. G. P., 414 (Typh.)
Marquet, R. (joint author), (1064) (Tryp.)
Marsboom, R., (933) (Tryp.)
Marshall, T. K., 1120 (Vms.)
Marti, H. R. (joint author), 41 (Am.)
Martin, D. F. (joint author), 889 (Ent.)
Martin, P. & Mathieu, C., 752 (Vms.)
—— (joint author), 874 (Vms.)
Martinez de Jesus, J. (joint author), 1325 (Hel.)
Martinez Quehl, R. (joint author), 385 (Mal.)
Martinez-Rivera, E. & Koppisch, E., 714 (Hel.)
Martinez-Silva, R. (joint author), 169 (Am.)
Martini, E., 295 (R.F.), (817) (Chl.)
Martinović, A. (joint author), 766 (Ent.)
Marx, H. (joint author), 1026, 1027 (Ent.)
Mason, P. J. & Haddow, A. J., 1072 (Den.)
Masse, A., Mabille, E., Merle, H. & Chebat, J., (431) (Am.)
Massi, O., (1115) (Hel.)
Massie, R. W. & Hartmann, R. C., 1348 (Haem.)
Mastbaum, O., 10, 1053, 1390 (Mal.)
Matajc, L., Fettich, D., Vandot, S., Čermelj, V., Kramberger, V., Božič, C. & Likar, M., 95 (Parasit.)
Mathieu, C. (joint author), 752 (Vms.)
Mathis, W., Schoof, H. F., Quarterman, K. D. & Fay, R. W., 6 (Mal.)
Mathurin, L., 1154 (Mal.)
Matossian, R. M. (joint author), 1335 (Hel.)
Matoth, Y. (joint author), (340) (Haem.)
Matthey, G. (joint author), 979 (Hel.)
Mattingly, P. F., (500), 767 (Ent.)
—— (joint author), (498), (500) (Ent.)
Mavros, A. J. (joint author), 889 (Ent.)
Mazaud, R., Labegorre, J. & Moissinac, J., (1355) (Vms.)
— — (joint author), 1347 (Haem.)
Mazzitelli, L., (153) (Typh.)
Mazzotti, L., 1332 (Hel.)
—— & Méndez, D., 983 (Hel.)
Meal, H. (joint author), (1222) (Def. Dis.)
Mechali, D., Plissier, M. & De la Vaissiere, C., (209) (Haem.)
——, Seguin, F., Plissier, M., De la Vaissiere, C. & Mouline, A., (208) (Haem.)
—— (joint author), (866) (Haem.)
Medical Res. Council of New Zealand, 101 (Reports, etc.)
Meers, P. D., 1311 (Y.F.)
Mehrotra, K. N. & Smallman, B. N., 1476 (Ent.)
Mehta, G. & Gopalan, C., 861 (Def. Dis.)
Mehta, J. B., (470) (Def. Dis.)
Mel, D. (joint author), (945) (Typh.)
Melen, G. (joint author), 1198 (Lep.)
Meleney, H. E. (joint author), 1081, 1412 (Am.)
Melis, R. & Catella, F., 240 (Ent.)
Mello Leitão, A., (1002) (Vms.)
Mel'Nikov, L. A., 1306 (Typh.)
Melnotte, P. & Mengus, B., (412) (Typh.)
—— & Petit, J., (415) (Typh.)
Meltzer, L. E. & Bockman, A. A., 1345 (Hel.)
Melvin, D. M., Sadun, E. H. & Heimlich, C. R., 185 (Hel.)
Méndez, D. (joint author), 983 (Hel.)
Mendieta Hechevarria, J. M. (joint author), 966 (Lep.)
Mendonça, I. de A. (joint author), 1462 (Tox.)
Menezes, H., 1426 (Hel.)
—— (joint author), 1427 (Hel.)
Mengano, G. & Inglese, F., 1075 (Rab.)
Mengle, D. C. & Fisk, F. W., 242 (Ent.)
Mengus, B. (joint author), (412) (Typh.)
Menn, J. J., Benjamini, E. & Hoskins, W. M., 1252 (Ent.)
Menon, M. A. U. (joint author), (500) (Ent.)
Menon, M. K. (joint author), 131 (Mal.)
Menzies, D. W. & Mills, K. W., (756) (Misc. Dis.)
Mer, G. G. & Cwilich, R., 888, 1021 (Ent.)
—— (joint author), 889 (Ent.)
Meranze, D. R. (joint author), 1208 (Hel.)
Mercado, T. I & Von Brand, T., 1392 (Mal.)
Mercier, P. (joint author), 608 (Tox.)
Merle, H. (joint author), (431) (Am.)
Merle, M. (joint author), (719) (Hel.)
Meron, A. V. (joint author), 889 (Ent.)
Merskey, C. & Hansen, J. D. L., 744 (Def. Dis.)
Mertens, R. (joint author), (1119) (Vms.)
Merveille, P. (joint author), 539 (Tryp.), 1184 (Rab.)
Metabolism, New York, 190 (Def. Dis.)
Metcoff, J., Frenk, S., Gordillo, G., Gómez, F., Ramos-Galván, R., Cravioto, J., Janeway, C. A. & Gamble, J. L., (1346) (Def. Dis.)
—— (joint author), (1346), 1451 *bis* (Def. Dis.)
Metselaar, D., 528, 651, (652), 779 (Mal.)
Meyer, B. J. (joint author), 1227 (Haem.)
Meyer, H. & Mendonça, I. de A., 1462 (Tox.)
Meyer, K. F. (joint author), 677 (Pl.)
Michard, V. (joint author), 751 (Vms.)
Michel, G. (joint author), 148 (Leish.)
Michelson, E. H. & Augustine, D. L., 1101 (Hel.)
—— (joint author), 1204 *bis* (Hel.)
Michon, P., Heully, F., Dornier, R., Larcan, A., Huriet, C. & Peters, A., (843) (Hel.)
Micks, D. W. & McKibben, J. W., 362 (Ent.)
—— (joint author), 1474 (Ent.)
Middlebrook, J. E., 208 (Haem.)
Middlemiss, J. H., 1121 (Tox.)
Mihályi, F. & Zoltai, N., 884 (Ent.)
Mikhalenok, Z. V., 1183 (Rab.)
Miki, T. (joint author), 669 (Typh.)
Mikołajczyk, E. (joint author), 807, 1167 (Typh.)
Mikuni, M., Sagae, K., Saito, S. & Tsuchiya, H., 878 (Oph.)
——, Saito, S., Sagae, K. & Tsuchiya, H., 878 (Oph.)
Milani, R., 1141, 1255 (Ent.)
Miletto, G. (joint author), 140, 403 (Tryp.), (475) (Haem.)
Milewska, L. (joint author), 801 (Typh.)
Milivojević, M. (joint author), (945) (Typh.)
Mille, R. (joint author), 67 (Hel.)
Miller, J. W. (joint author), 292 *bis* (Am.)
Miller, L. T. (joint author), 477, 875 (Tox.)
Mills, K. W. (joint author), (756) (Misc. Dis.)
Milovanović, M. & Popović, D., 1284 (Mal.)
—— (joint author), (945) (Typh.)
Mimioglu, M. & Akyol, M., 184 (Hel.)
Mims, C. A., 1404 (Y.F.)
Minculescu, M., Bîrzu, I., Creţu, S., Iovănescu, F., Ionescu, D., Lupulescu, V., Michel, G., Paulon, S., Rotaru, A., Rusovici, I. & Zaharia, C., 148 (Leish.)
Minnich, V. (joint author), 1233 (Haem.)
Minning, W. & McFadzean, J. A., 986 (Hel.)

Mintz, D. T., Miller, J. W., Ottolenghi, P., Schack, J., Van Assendelft, F. & Most, H., 292 (Am.)
—— (joint author), 292 (Am.)
Miranda, A. (joint author), 660 (Tryp.)
Miranda, M., 185 (Hel.)
Mirković, M. (joint author), (945) (Typh.)
Mirzoeva, N. M. (joint author), 554 (Typh.)
Mishchenko, N. K. (joint author), 555 (Typh.)
Misra, B. G., 781 (Mal.)
—— & Nair, C. P., (1293) (Mal.)
—— (joint author), 244 (Lab.), 391, 794 (Mal.)
Mistric, W. J., Jr. & Martin, D. F., 889 (Ent.)
Mitchell, J. D. (joint author), 618 (Misc. Dis.)
Mitidieri, E. (joint author), (83) (Vms.)
Mitlin, N., (240) (Ent.)
—— (joint author), 1138 (Ent.)
Mitra, R. D., 238 (Ent.)
Mitsuda, K., 830 (Lep.)
Miura, A. (joint author), (277), 412, (670) (Typh.)
Moawad, M. B. (joint author), 1203 (Hel.)
Moçambique, 1028 (Reports, etc.)
Modica, R. & Maraini, G., 1230 (Haem.)
Mohamed, A. H. & Zaky, O., 343 (Vms.)
Mohammed, I. (joint author), 742 (Def. Dis.)
Mohan, B. N. (joint author), 884 (Ent.)
Mohr, C. O. & Smith, W. W., 1066 (Typh.)
Moissinac, J. (joint author), 1347 (Haem.), (1355) (Vms.)
Molina Pasquel, C. & Gutiérrez Ballesteros, E., 821 (Am.)
Molinari, V., 429, 571 (Am.)
—— & Montezin, G., 405 (Tryp.), 536 (Mal.)
—— (joint author), 41 (Am.), 1101, 1103 (Hel.)
Monchadskiĭ, A. S., 231 (Parasit.)
Moneta, G. (joint author), 831 (Lep.)
Moniuszko, A. (joint author), 623 (Parasit.)
Monson, W. B. L., 928 (Tryp.)
Montauban, Sterckx, P. & Van Laer, 923 (Mal.)
Montestruc, E., 443 (Lep.)
—— & Berdonneau, R., 267 (Mal.)
—— & Collet, A., 873 (Haem.)
Montezin, G. (joint author), 405 (Tryp.), 536 (Mal.)
Monthly Bull. Ministry of Health & Pub. Health Lab. Service, 675 (Rab.)
Moody, M. D., Goldman, M. & Thomason, B. M., 492 (Misc. Dis.)
—— (joint author), 492 (Misc. Dis.)
Moon, A. P. (joint author), 232 (Parasit.), 1331 (Hel.)
Moore, D. V. & Sandground, J. H., 453 (Hel.)
Moore, G. J. (joint author), 1179 (Rab.)
Moore, J. B. (joint author), (888) (Ent.)
Moore, J. C. (joint author), 354 (Der.)
Moore, P. J. (joint author), 853, 1113 (Hel.)
Moorefield, H. H. & Kearns, C. W., 764 (Ent.)
Mooser, H. & Weyer, F., 1024 (Ent.)
—— (joint author), 45, 824 (R.F.)
Morales G., J., (1419) (Ys.)
Moreau, A. (joint author), 1111 (Hel.)
Morel, J. (joint author), (241) (Ent.)
Moreland, C. R. & McLeod, W. S., (1138) (Ent.)
Morelj, M. & Gerbec, M., 281 (Typh.)
—— (joint author), 556, (945) (Typh.)
Moreno, M. E. (joint author), 1453 (Def. Dis.)
Morera, P. & Barbareschi, G., 1006 (Tox.)
Moretti, G., Benelli, C. & Staeffen, J., (819) (Am.)
Morgan, H. V. (joint author), 350 (Der.)
Mori, N., (88) (Oph.)
Morikawa, T. (joint author), (1254) (Ent.)
Morris, J. A., Aulisio, C. G. & McCown, J. M., 216 (Tox.)
Moses, W. S., Matoth, Y. & Levin, S., (340) (Haem.)
Mosna, E. (joint author), 631 (Ent.)
Most, H. (joint author), 292 *bis* (Am.)
Mostofi, F. K., Vorder Bruegge, C. F. & Diggs, L. W., 999 (Haem.)
Motulsky, A. G., 213 (Haem.)
Mouchet, J., Gariou, J. & Rivola, E., 1248 (Ent.)
—— (joint author), 4 (Mal.)
Mouline, A. (joint author), (208) (Haem.)
Moura Gonçalves, J., 750 (Vms.)
—— & Arantes, E. G., 750 (Vms.)
Mourão, M. da C., (264) (Mal.)
Moussa, K., 859 (Def. Dis.)
Msangi, A. S., 393, 1284 (Mal.)
Mudrow-Reichenow, L., 433 (Am.)
—— (joint author), 687 (R.F.)
Mueller, R. (joint author), 738 (Def. Dis.)
Muggleton, W. J. (joint author), 819 (Am.)
Mühlpfordt, H. & Martinez-Silva, R., 169 (Am.)
Muir, E., 696 (Lep.)
Muirhead-Thomson, R. C., 466 (Hel.)
Mukerjee, N. & Sen, N. R., 1089 (Lep.)
Mukerjee, S. & Roy, U. K. G., 427 (Chl.)
Müller, G. (283) (Rab.)
Mulligan, W. (joint author), 182 (Hel.)
Mullin, W. G. (joint author), 171 (Am.)
Murai, S. (joint author), 278 (Typh.)
Murakami, K., 841 (Hel.)
—— (joint author), 457, 734 (Hel.)
Murnane, T. G. (joint author), 29 (Rab.)
Murray, W. S., 1476 (Ent.)
Myer, W. H., 297 (Lep.)
Mynors, J. M., 586 (Hel.)
Myrseth, O., 320 (Hel.)

N

Nador, E. (joint author), 147 (Tryp.)
Nagata, A. (joint author), 1181 (Rab.)
Nagata, K. (joint author), 721 (Hel.)
Nagaty, H. F., Moawad, M. B. & Salem, S., 1203 (Hel.)
—— & Rifaat, M. A., 1473 (Parasit.)
—— (joint author), 725 (Hel.), 994 (Def. Dis.)
Nagazawa, Y. (joint author), 454 (Hel.)
Naguib, M. & Robson, J. M., 55, 299 (Lep.)
Nail, S. K., Kothari, B. V., Jhaveri, C. L., Sukumaran, P. K. & Sanghvi, L. D., 1117 (Haem.)
Nair, C. P. & Menon, M. K., 131 (Mal.)
—— (joint author), 11 *bis*, 130, 131, 391, (1293) (Mal.), 797 (Tryp.)
Nàjera, L., (202) (Def. Dis.)
Najim, A. T. (joint author), 450 (Hel.)
Nakabayashi, T. (joint author), 656 (Tryp.)
Nakamura, M., 289, 1081 (Am.), 1317 (Am.), 1322 (Lep.)
—— & Baker, E. E., 40, 288 (Am.)
—— & Goldstein, L., (1081) (Am.)
—— & Jonsson, S., 818 (Am.)
Nakamura, Y., (1361) (Oph.)
Na-Nakorn, S. & Minnich, V., 1233 (Haem.)
Náquira, F. & Neghme, A., 1165 (Tryp.)
—— (joint author), 479 (Tox.)

Naranjo Grande, E. (joint author), 8 (Mal.)
Narasinga Rao, B. S. & Gopalan, C., 863 (Def. Dis.)
Narayanan, M. S., Shenoy, K. G. & Ramasarma, G. B., 996 (Haem.)
Nash, R. H. (joint author), 96 (Ent.)
Nash, T. A. M., 132 (Tryp.)
—— & Steiner, J. O., 1394 (Tryp.)
Nastukova, O. K. (joint author), 941 (Typh.)
Natalizi, G. (joint author), (242) (Ent.)
Nauck, E. G., 513 (B.R.)
Naumovic, M. (joint author), 469 (Def. Dis.)
Neal, R. A., 168, 429, 1414 *bis* (Am.)
—— & Vincent, P., 167 (Am.)
Nedungadi, V. S., (420) (Rab.)
Neel, J. V., (603) (Haem.)
——, Hiernaux, J., Linhard, J., Robinson, A., Zuelzer, W. W. & Livingstone, F. B., 82 (Haem.)
—— (joint author), (869) (Haem.)
Neghme, A., Silva, R. & Silva, Y., 588 (Hel.)
—— (joint author), 460 (Hel.), 1165 (Tryp.)
Nègre, A. & Fontan, R., 578, 579 *bis* (Lep.)
Nehaul, B. B. G., 464 (Hel.)
Neitz, W. O., 476 (Tox.)
Nelson, B. M. (joint author), 624 (Parasit.)
Nelson, G. S. & Heisch, R. B., 592 (Hel.)
Neogy, B. P. & Kachroo, P., 261, (387) (Mal.)
Neri, I. (joint author), 1294 (Mal.)
Nerurkar, R. V. & Khanolkar, V. R. 51 (Lep.)
Nery-Guimarães, F. (joint author), 50 (Lep.)
Neto, A. V. R., Azulay, R. D., e Silva, C. O. & De Andrade, L. M. C., 445 (Lep.)
Netsengevich, M. R., 679 (Pl.)
Nettel Flores, R., (892) (Ent.)
Netter, R., 564 (Rab.)
Nevárez Vásquez, C. & Avilés Nugué, F., (684) (Am.)
Newling, P. S. B. (joint author), 1362 (Heat Str.)
Newson, H. D., Blakeslee, T. E., Toshioka, S., Sakai, M., Wheeler, C. M., Shimada, T. & Akiyama, J., (500) (Ent.)
Nguyen-Ba-Khoi (joint author), 1472 (Misc. Dis.)
Nguyen-Hoai-Duc (joint author), 1472 (Misc. Dis.)
Nguyen-Van-Ai, 1185 (Pl.)
——, Nguyen-Hoai-Duc & Nguyen-Ba-Khoi, 1472 (Misc. Dis.)
Nicholas, G. J., 442 (Lep.)
Nicol, B. M., 198, 468 (Def. Dis.), 601 (Haem.)
Niedmann, G. (joint author), 1064, 1300 (Tryp.), 1234 (Vms.)
Nieto-Caicedo, M., 121 (Mal.)
Nigeria, Northern, 123 (Mal.), 1162 (Tryp.)
Nigrelli, R. F. (joint author), 476 (Tox.)
Nikolitsch, M. & Jelesitsch, Z., 812 (Rab.)
Niles, W. J. (joint author), 849, 1215 (Hel.)
Nimbkar, Y. S. (joint author), 814 (Pl.)
Ninane, G., Brakel, J. & De Coster, P., 1338 (Hel.)
Ninane, J. (joint author), 481 (Der.)
Nishimoto, M. & Sakamoto, Y., 1434 (Hel.)
—— (joint author), 457 (Hel.)
Nishimura, K., 722, 723 (Hel.)
—— (joint author), 724 (Hel.)
Nishioka, K. (joint author), 277 (Typh.)
Nishiura, M. (joint author), 51 (Lep.)
Nitzani (Genazzani), C. (joint author), 719 (Hel.)
Nobrega, G. (joint author), 660 (Tryp.)
Noel, A., 1441 (Hel.)
Noel, R. & Marie-Suzanne (Soeur), 835 (Lep.)
Noel-Buxton, M. B., 188 (Hel.)
Nogueira, A. R. (joint author), 270, 271 (Tryp.)
Nolasco, J. O. (joint author), 829, 1200 (Lep.)
Nöller, H. G. & Rohwedder, W., 922 (Mal.)
Noordhoek, K. (joint author), (605) (Haem.)
Norman, L., 598 (Hel.)
—— (joint author), 737, 1115, 1116 (Hel.)
Norris, J. E., Hanson, H. H. & Loeffler, R. K., 208 (Haem.)
Nose, H., 1308 (Typh.)
Noskova, E. G. (joint author), 1306 (Typh.)
Novi Sad, 164 (Rab.)
Nunes, R. M. B. (joint author), 1427 (Hel.)
Nurge, E., (1449) (Def. Dis.)
Nussenzweig, R. S. (joint author), 146 (Tryp.)
Nussenzweig, V., Amato Neto, V., De Freitas, J. L. P., Nussenzweig, R. S. & Biancalana, A., 146 (Tryp.)
Nwokolo, C., 1460 (Haem.)
Nyberg, W. & Östling, G., 183 (Hel.)

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O'Brien, R. D., (1141) (Ent.)
O'Connor, J. L. (joint author), 1176 (Den.)
Oda, T., 316, 317 (Hel.)
O'Daly, J. A., 898 (B.R.)
Oeconomidès, E. (joint author), (1352) (Haem.)
Oey Hoey Giok (joint author), (475) (Haem.)
Offutt, A. (joint author), 39 (Am.)
O'Gower, A. K., 24 (Y.F.)
Ohela, K. (joint author), 1333 (Hel.)
O'Hern, E. M. & Henry, B. S., 611 (Der.)
Ojha, K. N., 70 (Hel.)
Oka, S. (joint author), 454 (Hel.)
Okazaki, T. (joint author), (99) (Ent.)
Økland, F., 965 (Lep.)
Okpala, I., 493 (Parasit.), 1201 (Hel.)
Oldmeadow, D. J., 996 (Haem.)
Oleś, A. & Kurzeja, K., 807 (Typh.)
——, ——, Lewińska, Z. & Frygin, C., 807 (Typh.)
Olia, P. (joint author), 1023 (Ent.)
Oliver-Gonzalez, J. (joint author), 712 (Hel.)
Olivier, L. & Barbosa, F. S., 974, 975 (Hel.)
Olsufiev, N. G., 1268 (Reports, etc.)
—— *et al.*, 1267 (Reports, etc.)
—— (joint author), 1266 (Reports, etc.)
Omardeen, T. A., 1370 (Ent.)
Onabamiro, S. D., 329 (Hel.)
Ono, Y. (joint author), 669 (Typh.)
Oomen, H. A. P. C., 993, 1449 (Def. Dis.)
Orfila, J. (joint author), 13, 537, 654 (Mal.)
Orlandella, V. & Andrini, F., 1355 (Tox.)
—— (joint author), 1355 *bis*, 1356 (Tox.)
Ormerod, W. E., 656 (Tryp.)
Osaki, H. (joint author), 656 (Tryp.)
Oshima, T. (joint author), 1193 (Lep.)
Osnes, M., 1445 (Hel.)
Ospital, M. T. (joint author), 203 (Def. Dis.)
Östling, G. (joint author), 183 (Hel.)
Otero, A. G. (joint author), 1422 (Lep.)
Otero, P. J. (joint author), 309 (Hel.)
Othman, I. A., (971) (Hel.)
Otori, Y. (joint author), 1331 (Hel.)
Otto, J. S. (joint author), 431, 569 (Am.)
Ottolenghi, P. (joint author), 292 *bis* (Am.)

Ovazza, M., Hamon, J., Rickenbach, A. & Morel, J., (241) (Ent.)
—— (joint author), 668 (Typh.)
Owens, P. N., 395 (Mal.)
Oytun, H. S., 1209 (Hel.)
Ozawa, K., 1431, 1432 (Hel.)
Ozeretskovskaya, N. N. & Uspensky, S. M., 988 (Hel.)

P

Packchanian, A., 542, 663, 1164 (Tryp.)
Padron, C. (joint author), 703 (Lep.)
Pakrasi, M. (joint author), 126 (Mal.)
Palafox, C. A. (joint author), 1200 (Lep.)
Palencia, L. (joint author), 216 (Tox.)
Pampana, E. J., (1291) (Mal.)
Pampiglione, S., 888, 1476 (Ent.)
Pan American Sanitary Bureau, 1405 (Y.F.)
Pan, C. (joint author), 457 (Hel.), 880 (Parasit.)
P'An, J. P. (joint author), 1329 (Hel.)
P'An, J. S., Huang, M. H., Chiang, S. C., Lu, C. W., Hsü, C. Y. & Hsü, C. M., 716 (Hel.)
—— (joint author), 1329 (Hel.)
Panaitescu, D. (joint author), 179 (Hel.)
Pane, A., Pezzullo, C. & Schimizzi, M., (955) (Am.)
Pangalos, G. E., Pavlatos, M. & Mercier, P., 608 (Tox.)
Pani, A., 1303 (Leish.)
Pan-Malayan Scientific Advisory Council, 506 (Misc. Pap.)
Panthier, R., 159, (418), 561, 947 (Y.F.)
— & Husson, R. A., 1173 (Y.F.)
Pappagianis, D. (joint author), 222 (Der.)
Paque, C., 1225 (Def. Dis.)
Paraense, W. L., 60, 1326 (Hel.)
—— & Deslandes, N., 60, (181), (452) (Hel.)
Paraguassú, L. (joint author), 1465 (Tox.)
Paralker, N. A. (joint author), 822 (Am.)
Parande, A. S. (joint author), (475) (Haem.)
Pardo-Castello, V., 347 (Der.)
Parekh, J. G., 867 (Haem.)
Parish, R. H. (joint author), 1370 (Ent.)
Parker, H. (joint author), 478 (Tox.)
Parnell, J. L. (joint author), (1007) (Der.)
Parodi, Proust & Talarmin, 452 (Hel.)
Paroni, F. (joint author), 349 (Der.)
Parparcen, J. V., 898 (B.R.)
Parpart, A. K. (joint author), 209 (Haem.)
Parreira, F. (joint author), (746) (Haem.)
Parrot, L. & Abonnenc, E., (1021) *bis* (Ent.)
Pascher, F. & Keen, R., 1351 (Haem.)
Pasqualucci, M. E. A. (joint author), 879 (Misc. Dis.)
Passager, P., 1479 (Reports, etc.)
—— & Barbançon, S., 894 (Reports, etc.)
Passalacqua, L. A., Rodriguez-Molina, R. & Otero, P. J., 309 (Hel.)
Passey, R. F. & Fairbairn, D., (1337) (Hel.)
Passos, J., 390 (Mal.)
Pastacaldi, V., Sautet, J. & Vuillet, J., 1158 (Mal.)
—— (joint author), 793 (Mal.)
Patel, B. D., 739 (Def. Dis.)
——, Gaitonde, B. B., Jadhav, M. A. & Rao, G. S., 1452 (Def. Dis.)
Patel, R. J. (joint author), 84 (Tox.)
Paterson, D., 109 (B.R.)
Paterson, D. E., 1088 (Lep.)
Paterson, S. (joint author), 839 (Hel.)
Patraşcanu, V. (joint author), 479 (Tox.)
Pattanayak, S. & Raghavan, N. G. S., 730 (Hel.)
——, —— & Krishnaswami, A. K., (327) (Hel.)
Patterson, P. R. (joint author), 419 (Den.)
Pattillo, W. H. (joint author), (267) (Mal.)
Patz, I. M., 996 (Haem.)
Paul, R., 305 (Hel.)
Paulini, E., 364 (Ent.)
—— & Fomm, A. S., (1374) (Ent.)
—— & Pellegrino, J., 1103 (Hel.)
—— & Reis, S. R., (891) (Ent.)
—— (joint author), 1428 (Hel.)
Paulon, S. (joint author), 148 (Leish.)
Pavlatos, M. (joint author), 608 (Tox.)
Pavlovsky, E. N., 1267 (Reports, etc.)
——, Petrishcheva, P. A., Zasukhin, D. N. & Olsufiev, N. G., 1266 (Reports, etc.)
Pawłowski, Z. & Rydzewski, A., 330 (Hel.)
— (joint author), 300 (Hel.), 756 (Parasit.)
Payet, M., 1451 (Def. Dis.)
—— & Pène, P., 487 (Misc. Dis.)
Pchelkina, A. A., Zhmaeva, Z. M. & Zubkova, R. I., 554 (Typh.)
—— (joint author), 555 (Typh.)
Pearson, F. A. (joint author), 389 (Mal.)
Peck, F. B., Jr., Powell, H. M. & Culbertson, C. G., 420 (Rab.)
Peeters, E. (joint author), 1450 (Def. Dis.)
Pellegrino, A. & Giudicelli, P., 1096 (Hel.)
Pellegrino, J. & Brener, Z., 715 (Hel.)
——, — & Jacomo, R., 1300 (Tryp.)
—— & Macedo, D. G., 1429 (Hel.)
—— & Nunes, R. M. B., 1427 (Hel.)
——, Paulini, E., Pompeu, J. M. & Macedo, D. G., 1428 (Hel.)
——, Pompeu Memória, J. M. & Macedo, D. G., 1328 (Hel.)
—— (joint author), 1103 (Hel.)
Peña-Chavarría, A., Lizano, C. & Xirinachs, H., 985 (Hel.)
Peñalver, L. M. & Martinez Quehl, R., 385 (Mal.)
Pène, P. (joint author), 487 (Misc. Dis.)
Peng, C. T. (joint author), 759 (Ent.)
Pereira, M. J., Jr. & Nery-Guimarães, F., 50 (Lep.)
Perera y Prats, A., (589) (Hel.)
Perez Alva, S., (1069), 1172 (Bart.)
—— & Giuntini, J., 1402 (Bart.)
——, Roger, F. & Roger, A., 1403 (Bart.)
Pérez-Santiago, E. (joint author), 204, 205 (Sp.), 311 (Hel.)
Perisse, J. (joint author), (1222) (Def. Dis.)
Perrellon, G. (joint author) ,1454 (Def. Dis.)
Perret, J. L. & Mertens, R., (1119) (Vms.)
Perrin, G. (joint author), 1454 (Def. Dis.)
Pesqueira, M. E., 1157 (Mal.)
Pesse, N. (joint author), 459 (Hel.)
Pessôa, S. B., Da Silva, L. H. P. & Costa, L., 94 (Parasit.)
Pessoa, V. & Menezes, H., 1427 (Hel.)
Peters, A. (joint author), (843) (Hel.)
Peters, F. E., (1346) (Def. Dis.)
Peters, W., 117 (Mal.)
—— & Standfast, H., 1383 (Mal.)
Peterson, B. V. (joint author), (628) (Ent.)
Peterson, G. D., Jr., 591 (Hel.)
Peterson, R. E. (joint author), 80 (Haem.)
Petit, J. (joint author), (415) (Typh.)
Petrauskas, L. E., (509) (Misc. Pap.)

Petrishcheva, P. A. (joint author), 1266 (Reports, etc.)
Petrone, P., 720 (Hel.)
Petrovický, O., 1359 (Tox.)
Petrovitch, Z. (joint author), 219, 876, 1238 (Tox.), 432 (Am.)
Petrus, E. & Velarde Thomé, J., 961 (Ys.)
Pezzullo, C. (joint author), (995) (Am.)
Pfister, R. (joint author), 1216 (Hel.)
Pharmaceutical Society of Great Britain, 1483 (B.R.)
Phipps, J., 1368 (Ent.)
Pick, F., 1165, 1166 (Tryp.)
—— & Saenz, A., Jr., 934 (Tryp.)
—— (joint author), 398 (Mal.)
Pickard, E. (joint author), (888) (Ent.)
Piek, W. (joint author), (562) (Rab.)
Piekarski, G., Hennig, W. & Sibbing, W., 1380 (B.R.)
Pieron, A. (joint author), 1197 (Lep.)
Pietryk, H. C. (joint author), 23 (Typh.)
Pifano C., F., 897 (B.R.)
—— & Ron Pedrique, M., 898 (B.R.), 1098 (Hel.)
Piganiol, G. & Hervé, A., 179 (Hel.)
——, —— & Pourpre, 181 (Hel.)
Pillat, A. & Thalhammer, O., 1358 (Tox.)
Pille, E. R. (joint author), 154 (Typh.)
Pille, G. (joint author), 203, 1453 (Def. Dis.), 616 (Heat Str.)
Pinkerton, H. (joint author), 944 *bis* (Typh.)
Pinotti, M., 936 (Tryp.)
—— & Soares, R., (1291) (Mal.)
Pinto, A. R. (joint author), 271, 404 (Tryp.)
Pinto, H. B., 897 (B.R.)
Piqueras Menéndez, E. & Bravo Oliva, J., (1134) (Parasit.)
Piquett, P. G. (joint author), 1138, 1139, (1477) *bis* (Ent.)
Piras, L. (joint author), 763 (Ent.)
Pirlo, F. (joint author), 402, (1061) (Tryp.)
Pizzi, T., 1396 (Tryp.)
—— & Chemke, S., J., 1063 (Tryp.)
Placidi, L. & Chevrier, L., 1073 (Rab.)
Plackett, R. L. (joint author), 1113 (Hel.)
Placucci, G. (joint author), 631 *bis* (Ent.)
Plagnol, H. & Dutrenit, J., 599 (Def. Dis.)
—— & Martin, P., 874 (Vms.)
Plane, J. (joint author), (85) (Tox.)
Planques, L. (joint author), 655 (Tryp.)
Platt, B. S., 472 (Haem.)
Pletsch, D. J., Tseng, P. T. & Chen, H. H., 1288 (Mal.)
—— (joint author), 1288 (Mal.)
Plissier, M., Mechali, D., Delons, S. & Fulcrand, G., (866) (Haem.)
—— (joint author), (208), (209) (Haem.)
Poddar, R. K. (joint author), 176, 702 (Lep.)
Poesponegoro, S. D. (joint author), 992 (Def. Dis.)
Poey Seng Hin (joint author), 992 (Def. Dis.)
Poirier, M. (joint author), 229 (Misc. Dis.)
Pokorný, J. (joint author), 280 (Typh.)
Pokrovskaya, E. V. (joint author), 154 (Typh.)
Polish Parasitological Society, 492 (Parasit.)
Politzer, W. M. & Beuchat, A., 969 (Hel.)
—— & Wayburne, S., 1223 (Def. Dis.)
Pollack, H., 190 *bis*, 191 *bis* (Def. Dis.)
—— & Eby, T. M., 191 (Def. Dis.)
—— (joint author), 191 *sept* (Def. Dis.)
Pollitzer, R., 34, 1077, 1187 (Chl.)
Pompeo, I. & Paroni, F., 349 (Der.)
Pompeu, J. M. (joint author), 1428 (Hel.)
Pompeu Memória, J. M. (joint author), 1328 (Hel.)
Poncet, A. (joint author), 12, 791, 926, 927 (Mal.)
Poole, J. B. (joint author), 320 (Hel.)
Pop-Cenitch, S. (joint author), 1238 (Tox.)
Popović, D. (joint author), 837 (Hel.), 1284 (Mal.)
Porges, N. (joint author), 898 (B.R.), (1002) (Vms.)
Portilla, J. (joint author), 848 (Hel.)
Postiglione, M. & Venkat Rao, V., 782 (Mal.)
Potenza, L., 898 (B.R.)
—— (joint author), (562) (Rab.)
Potter, M. D. (joint author), 545 (Tryp.)
Poul, J. & Rampon, R., 30, (1073) (Rab.)
Pourpre (joint author), 181 (Hel.)
Povalishina, T. P. (joint author), (1171) (Typh.)
Powell, E. D. U., 293 (Am.)
Powell, H. M. (joint author), 420 (Rab.)
Powell, S. P. (joint author), 431 (Am.)
Powers, E. L. (joint author), 944 *bis* (Typh.)
Pradatsundarasar, A. (joint author), 1109 (Hel.)
Praderi, L. A. (joint author), 718 (Hel.)
Prakash, C. (joint author), (1246) (Misc. Dis.)
Prasad, B. G. (joint author), 425 (Chl.)
Prats, F. & Schenone, H., 1121 (Vms.)
Preger, L. (joint author), 571 (Am.)
Press, J. (joint author), 392 (Mal.)
Press, J. M. (joint author), 1284 (Mal.)
Pretorius, P. J. (joint author), 743 (Def. Dis.)
Price, S. G. & Weiner, L. M., 736 (Hel.)
Prince, F. M. (joint author), 32, 678 (Pl.)
Pringle, G., 799 (Leish.)
—— & Garrett-Jones, C., 1046 (Mal.)
Prívora, M. (joint author), 280 (Typh.), (1373) (Ent.)
Proc. Nutrition Soc., 472 (Haem.)
Proc. Roy. Soc. Med., 620 (Parasit.)
Prokopenko, L. I. (joint author), 642 (Mal.)
Proust (joint author), 452 (Hel.)
Pshenichnov, A. V. & Noskova, E. G., 1306 (Typh.)
Public Health Rep., Wash., 296 (Lep.)
Pukhner, A. F. (joint author), 1466 (Oph.)
Pulver, W. & Fellmann, N., (417) (Typh.)
Purananda, C., 899 (B.R.)
Purcallas, J. (joint author), 1439 (Hel.)
Puri, B. S. (joint author), 462 (Hel.)
Pylkkö, O. O., 183, (320) (Hel.)
Pyne, C. K. (joint author), 409 (Leish.)

Q

Quagliato, R., 1192 (Lep.)
—— (joint author), 446 *bis*, 1194 (Lep.)
Quan, S. F., Hartwell, W. V., Scott, K. G. & Peng, C. T., 759 (Ent.)
—— (joint author), 32, 284, 285 (Pl.)
Quarterman, K. D. (joint author), 6 (Mal.)
Quattrocchi, G., Orlandella, V. & Andrini, F., 1356 (Tox.)
Quinby, G. E. (joint author), (502) (Ent.)
Quintin, Desnues & Audran, 946 (Typh.)
Quist, K. D., Eads, R. B. & Conklin, A., (563) (Rab.)

R

Raafat, A. (joint author), 1099 (Hel.)
Rabelo, E. X. (joint author), 1084 (Am.)
Rabii, H. (joint author), 738 (Def. Dis.)
Rabinovici, N. (joint author), 170 (Am.)
Race, G. J. (joint author), 331 (Hel.)
Rachmilewitz, M. (joint author), 866 (Haem.)
Rachou, R. G. & Lacerda, N. B., 1340 (Hel.)
——, Villela, A. M., Cruz, A. E. & De Carvalho, G., 1444 (Hel.)
Radej, N. (joint author), 469 (Def. Dis.)
Radke, M. G., Schneider, M. D. & Houghtaling, D. G., (973) (Hel.)
—— (joint author), 1329 (Hel.)
Radvan, R., 1268 (Reports, etc.)
—— (joint author), 808 (Typh.)
Raettig, H., 1379 (B.R.)
Raffaele, G., 1051, 1285 (Mal.)
—— & Coluzzi, M., 925 (Mal.)
Rageau, J. (joint author), 678 (Pl.), 752 (Vms.), 938 (Leish.)
Raghavan, N. G. S., 463 (Hel.)
—— (joint author), (327), 462, 730, 852, (1112), 1446 (Hel.)
Raginis, Z. (joint author), 1171, 1307 (Typh.)
Rahim, A. (joint author), 1391 (Mal.)
Rahm, U., 501 (Ent.)
Rahman, J., Singh, M. V. & Pakrasi, M., 126 (Mal.)
Raicu, V. (joint author), 1398 (Leish.)
Raison, C. G. (joint author), 1431 (Hel.)
Rajagopalan, N., Vedamanikkam, J. C. & Ramoo, H., 126 (Mal.)
Rajagopalan, P. K. (joint author), 1247 (Ent.)
Rajindar Pal & Sharma, M. I. D., (766) (Ent.)
Rama Rao, R. & Sirsi, M., 132, 399, 535 (Mal.)
Rama Rao, T. S. (joint author), 649 (Mal.)
Ramachandra Rao, T. & Rajagopalan, P. K., 1247 (Ent.)
Ramachandran, M. S. (joint author), 665 (Leish.)
Ramakrishna, V. & Elliott, R., 1052 (Mal.)
Ramakrishnan, S. P., David, A. & Nair, C. P., 797 (Tryp.)
——, Satya Prakash & Sen Gupta, G. P., 397 (Mal.)
—— (joint author), 1152 (Mal.)
Ramalho, A. C. R. (joint author), 1367 (Parasit.)
Ramalho, G. R. (joint author), 1020 (Ent.)
Ramanathan, K. S. (joint author), 860 (Def. Dis.)
Ramanathan, M. K. (joint author), 1455 (Def. Dis.)
Ramanujam, K., 833 (Lep.)
Ramasarma, G. B. (joint author), 996 (Haem.)
Ramoo, H. (joint author), 126 (Mal.)
Ramos, A. da S. & Lima, H. M. de A., 798 (Tryp.)
Ramos e Silva, J., (581) (Lep.)
—— (joint author), 1086 (Lep.)
Ramos-Galván, R. (joint author), 199, 333, (1346), 1346, 1451 *bis*, 1453 (Def. Dis.)
Rampon, R. (joint author), 30, 1073 (Rab.)
Ramsine, S. (joint author), 432 (Am.)
Ranque, J., Depieds, R. & Faure, A., 45 (R.F.)
Ransom, J. P., 566 (Pl.)
Ransone, J. W. & Lange, R. D., 873 (Haem.
Rao, G. S. (joint author), 1452 (Def. Dis.)
Rao, P. V. (joint author), 392 (Mal.)
Rao, S. S. (joint author), 814 (Pl.)
Rao, T. R. & Halgeri, A. V., 99 (Ent.)
Rao, V. K. (joint author), 588 (Hel.)
Raoult, A., 1219 (Def. Dis.)
——, Thomas, J., Thiery, G., Perrin, G. & Perrellon, G., 1454 (Def. Dis.)
Rapaport, S. I., Reilly, E. B. & Carpenter, G., 1230 (Haem.)
Raper, A. B., 1118 (Haem.)
—— & Dockeray, G. C., 321 (Hel.)
—— (joint author), 339 (Haem.)
Rashid, R. (joint author), 738 (Def. Dis.)
Raška, K. & Syrůček, L., 672 (Typh.)
——, ——, Soběslavský, O., Pokorný, J., Přívora, M., Havlík, O., Lím, D. & Zástěra, M., 280 (Typh.)
—— (joint author), 557 (Typh.), 1268 (Reports, etc.)
Rateau, J. (joint author), 4 (Mal.)
Rausch, R., 1333 (Hel.)
—— & Schiller, E. L., 845 (Hel.)
Rawal, B. D., Jahla, H. I. & Patel, R. J., 84 (Tox.)
Rawhy, A. (joint author), 764 (Ent.)
Ray, A. P., Basu, P. C., Misra, B. G. & Nair, C. P., 391 (Mal.)
—— & Sharma, G. K., 399 (Mal.)
——, —— & Misra, B. G., 794 (Mal.)
—— (joint author), 11 *bis*, 130, 131, 260 (Mal.)
Ray, H. N. (joint author), 274 (Leish.), (1248) (Ent.)
Raymond-Hamet, 1057 (Mal.)
Razumova, I. N., 231 (Parasit.)
Read, T. R. (joint author), 685, 686 (Am.)
Reagan, R. L., Yancey, F. S. & Brueckner, A. L., 282 (Den.), 813 (Rab.)
Reddy, C. R. R. M. (joint author), 588 (Hel.)
Reddy, D. B., Subramanyam, N. T., Reddy, C. R. R. M., Bhaskar, G. R. & Rao, V. K., 588 (Hel.)
Reddy, D. G. & Sriramachari, S., 742 (Def. Dis.)
Reed, C. F. & Wentworth, B. B., 945 (Typh.)
Reed, R. E. (joint author), 354 (Der.)
Rees, C. W. (joint author), 1412 (Am.)
Rees, R. J. W., 1420 (Lep.)
Reeves, R. E., Meleney, H. E. & Frye, W. W., 1081, 1412 (Am.)
Reeves, W. C. (joint author), 1249 (Ent.)
Regester, P. T., 364 (Reports, etc.)
Regonesi, C. (joint author), 479 (Tox.)
Rehn, F. & Radvan, R., 808 (Typh.)
Reichenow, E., 1300 (Tryp.)
Reid, E. T. & Woods, R. W., 1385 (Mal.)
Reid, E. T. M., (1368), (1372) (Ent.)
Reid, F. P. (joint author), 809 (Den.)
Reid, H. A., 747 *bis*, 1352 (Vms.)
—— (joint author), 82 (Vms.)
Reid, J. A. & Wharton, R. H., 127 (Mal.)
Reid, J. D. & Manning, J. D., 753 (Tox.)
—— (joint author), 1123 (Tox.)
Reilly, E. B. (joint author), 1230 (Haem.)
Reimann, H. A. & Sukaton, R. U., 357 (Misc. Dis.)
Rein, K., 718 (Hel.)
Reinhard, E. G., (981) (Hel.)
Reis, S. R. (joint author), (891) (Ent.)
Reiss-Gutfreund, R. J., 801 (Typh.)
Reitemeier, R. J. (joint author), 866 (Sp.)
Rementzova, M. M. & Gudoshnick, A. N., 1267 (Reports, etc.)
Remlinger, P. & Hadji, A., 28, 30 (Rab.)
Renbourn, E. T., (90) (Heat Str.)

Retaloza Díaz, T. (joint author), 847 (Hel.)
Reutner, T. F., Fisken, R. A., Dill, W. A., Glazko, A. J. & Weston, J. K., 821 (Am.)
—— (joint author), 820 (Am.)
Rey, L., 307 (Hel.)
Reye, R. D. K. & Ten Seldam, R. E. J., 360 (Parasit.)
Reyes, A. (joint author), 65, 315 (Hel.)
Reyes, O. (joint author), 1398 (Leish.)
Reynaud, J. (joint author), (475) (Haem.)
Rezette, J., 703 (Lep.)
Rhodes-Jones, R., 1254 (Ent.)
Ribeiro, H. de P., 1015 (Parasit.)
Ribeiro, L. P., Mitidieri, E. & Villela, G. G., (83) (Vms.)
Ricci, M. & Corbo, S., 1344 (Hel.)
Ricciardi, I. (joint author), 261 (Mal.)
Ricciardi, M. L. (joint author), 967 (Hel.)
Rice, H. M., 475 (Haem.)
Rickenbach, A. (joint author), (241), (498) *bis*, 760, (761) (Ent.)
Ridley, D. S., 833 (Lep.)
Rifaat, M. A. & Nagaty, H. F., 725 (Hel.)
—— (joint author), 994 (Def. Dis.), 1473 (Parasit.)
Rigg, A., 938 (Leish.)
Rinaudo, E. (joint author), 762 (Ent.)
Ringrose, E. J. (joint author), 221 (Der.)
Rioux, J. A. (joint author), (85) (Tox.), 235 (Ent.)
Ristić, L. & Brajović, R., 170 (Am.)
Rit, J. M. (joint author), 1216 (Hel.)
Ritchie, L. S., Hunter, G. W., Freytag, R. E., Pan, C., Yokogawa, M. & Lin, S. S., 880 (Parasit.)
—— (joint author), 457, 1331 (Hel.)
Ritchken, J. & Sanders, E., 180 (Hel.)
Ritterband, A. B., (joint author), 838 (Hel.)
Rivera, G. (joint author), 460 (Hel.)
Rivera, J. V., Rodriguez, H. F. & Pérez-Santiago, E., 311 (Hel.)
Rivola, E. (joint author), 4 (Mal.), 1248 (Ent.)
Rivosecchi, L. (joint author), 1372 (Ent.)
Robert, P. (joint author), (761) (Ent.)
Roberts, D. F. & Smith, D. A., 602 (Haem.)
Roberts, J. M. D., 8 (Mal.)
Robertson, J. A., 745 (Haem.)
Robertson, M., 135 (Tryp.)
Robinson, A. R. (joint author), 82, (869) (Haem.)
Robinson, J. (joint author), 1296 (Tryp.)
Robinson, M. C., 562 (Den.)
Robinson, R. G. (joint author), 1334 (Hel.)
Robinson, T. A. (joint author), 685, 686 (Am.)
Robinson, U., Béhar, M., Viteri, F., Arroyave, G. & Scrimshaw, N. S., 863 (Def. Dis.)
Robson, J. M. (joint author), 55, 299 (Lep.)
Roch, E. (joint author), 216, 1464 (Tox.)
Roche, J., Derrien, Y., Diacono, G., Durieux, J., Laurent, G., Reynaud, J., Roux, M. & Brangier, J., (475) (Haem.)
Roche, M., Enriqueta Perez-Gimenez, M., Layrisse, M. & Di Prisco, E., 1336 (Hel.)
Rodenwaldt, E., 246, 247 (B.R.), 1027 (Misc. Pap.)
—— & Jusatz, H. J., 1379 (B.R.)
Rodger, F. C., 1467 (Oph.)
Rodhain, J. (joint author), 620 (Parasit.)
Rodrigues, B. A., (1419) (Ys.)
Rodriguez, H. F., 713 (Hel.)
—— (joint author), 311 (Hel.)
Rodríguez, I. R. (joint author), 209 *bis* (Haem.)
Rodriguez, J. N., 1423 (Lep.)
Rodríguez, M., J. D., (238) (Ent.)
Rodríguez, O., 684 (Am.)
Rodriguez-Molina, R., Oliver-Gonzalez, J. & Serrano, D. G., 712 (Hel.)
—— (joint author), 309 (Hel.)
Roessler, W. G. (joint author), 351 (Der.)
Roger, A. (joint author), 20, 156 (Typh.), 1403 (Bart.), 1463 (Tox.)
Roger, F., Giroud, P., le Gac, P. & Roger, A., 156 (Typh.)
—— & Roger, A., 20 (Typh.), 1463 (Tox.)
—— (joint author), 1403 (Bart.)
Rogova, L. I., 572 (Am.)
Rogowsky, M., 989 (Def. Dis.)
Rohrbacher, G. H., Jr., 843 (Hel.)
Rohwedder, W. (joint author), 922 (Mal.)
Rokkaku, W. K. (joint author), 680 (Chl.)
Rolland, M. (joint author), (1222) *bis* (Def. Dis.)
Roller-Gusinde, R. E. (joint author), (625) (Parasit.)
Rollinson, D. H. L., 283, 564 (Rab.)
Rollo, I. M. (joint author), 1161 (Mal.)
Roman, E., Violet, P. & Rinaudo, E., 762 (Ent.)
Román, G. (joint author), 1055 (Mal.)
Román, J. (joint author), 1192 (Lep.), (1419) (Ys.)
Romaña, C., 547 (Tryp.)
Romanova, V. P., 1267 (Reports, etc.)
Romiti, C., 68 (Hel.)
Ron Pedrique, M. & Gerulewics, E., 898 (B.R.)
—— (joint author), 898 (B.R.), 1098 (Hel.)
Rose, W., 634 (B.R.)
Rosemberg, J. (joint author), 50, 698 (Lep.)
Rosen, H. (joint author), 1076 (Pl.)
Rosen, P. (joint author), 1253 (Ent.)
Rosenthal, F. D. & Lees, F., 859 (Def. Dis.)
Ross, A. A. (joint author), 148 (Leish.)
Ross, H., 829 (Lep.)
Ross Institute Industrial Advisory Committee, 485 (Ulc.)
Rossan, R. N., 1058 (Mal.)
Rossi Belgrano, C., Marquet, R. & Scliar, G., (1064) (Tryp.)
Rotaru, A. (joint author), 148 (Leish.)
Rotberg, A., 48 (Lep.)
—— (joint author), 438 (Lep.)
Rothe, H., 390 (Mal.)
Rothwell, W. S. (joint author), 990 (Def. Dis.)
Roubaud, E., 1298 (Tryp.)
Roux, J., 23 (Typh.)
Roux, M. (joint author), (475) (Haem.)
Rowan, L. C. & O'Connor, J. L., 1176 (Den.)
Rowan, W. B., 981 (Hel.)
Rowland, H. A. K., 306, 971 (Hel.)
Rowlands, A., 326 (Hel.)
Rowley, D. (joint author), 33 (Chl.)
Roy, A. N., Banerjee, G. & Banerjee, B. N., 19 (Leish.)
Roy, A. T., 54 (Lep.)
Roy, D. K. (joint author), 409 (Leish.), 424 (Chl.)
Roy, U. K. G. (joint author), 427 (Chl.)
Roychowdhury, S. P. (joint author), (1449) (Def. Dis.)
Rozeboom, L. E. (joint author), 1249 (Ent.)
Rubenstone, A. I. (joint author), 998 (Haem.)
Rubio, M., (1063) *bis*, 1299 (Tryp.)
Rucknagel, D. L., 1231 (Haem.)
Ruffié, J. (joint author), 404, 546 (Tryp.)
Ruiz Castañeda, M., 1307 (Typh.)

Ruiz Rodriguez, J. M., 897 (B.R.)
Ruiz Sanchez, A. (joint author), 8 (Mal.)
Ruiz Sanchez, F., Ruiz Sanchez, A. & Naranjo Grande, E., 8 (Mal.)
Rusovici, I. (joint author), 148 (Leish.)
Russell, F. E. & Van Harreveld, A., (874) (Vms.)
Russell, H. T. & Nelson, B. M., 624 (Parasit.)
Russell, P. F., 645, 1049 (Mal.)
Russfield, A. B. (joint author), 1455 (Def. Dis.)
Ruzié, J. (joint author), 982 (Hel.)
Rydzewski, A. (joint author), 330 (Hel.)
Ryer, R. R. (joint author), 191 *bis* (Def. Dis.)
Ryšavy, B. & Erhardova, B., 1268 (Reports, etc.)

S

Sabatier, J. (joint author), (85) (Der.)
Sabour, M. (joint author), 1202 (Hel.)
Saccà, G., 502, 1371 (Ent.)
—— & Benetti, M. P., 1251 (Ent.)
—— & Rivosecchi, L., 1372 (Ent.)
Sachdev, J. C. (joint author), 1246 (Misc. Dis.)
Sachdev, S., Sachdev, J. C. & Singh, R. C., 1246 (Misc. Dis.)
Sacre, J. & Dubois, A., 1203 (Hel.)
Sadek, M. A. (joint author), 994 (Def. Dis.)
Sadler, W. W. (joint author), 1309 (Typh.)
Sadovsky, A. (joint author), 866 (Haem.)
Sadun, E. H. & Allain, D. S., 1219 (Hel.)
——, —— & Heimlich, R., 1212 (Hel.)
—— & Norman, L., 737, 1116 (Hel.)
——, —— & Brooke, M. M., 1115 (Hel.)
—— (joint author), 185 (Hel.)
Saenz, A., Jr. (joint author), 934 (Tryp.)
Sáenz, A. C. (joint author), 1192 (Lep.)
Sagae, K. (joint author), 278 (Typh.), 877, 878, (878) (Oph.)
Sagar, P., Agarwala, S. C. & Shrivastava, D. L., 32, 423 (Pl.)
—— (joint author), 1186 (Pl.)
Saggese, S., 215 (Vms.)
Sagorin, L. (joint author), 1446 (Hel.)
Saif, M. (joint author), 1097 (Hel.)
Sailer, R. I., Marks, E. P. & Lienk, S., (502) (Ent.)
St. Hill, C. A. (joint author), 735 (Hel.)
Saito, S. (joint author), 878, (878) (Oph.)
Sakai, M. (joint author), (500) (Ent.)
Sakamoto, Y. (joint author), 734, 1434 (Hel.)
Salem, H. H., 305 (Hel.)
Salem, S. (joint author), 1203 (Hel.)
Salib, M. (joint author), 1202 (Hel.)
Saliternik, Z., 9, 384 (Mal.)
Salveraglio, F. J., Bacigalupi, J. C., Srulevich, S. & Viera, O., 22, 415 (Typh.)
Samamé, G. E., 689. (1419) (Ys.)
Samitca, D. C. (joint author), 1435 (Hel.)
Samšinák, K. (joint author), (1373) (Ent.)
Samuel, P. S., 700 (Lep.)
Sanders, E. (joint author), 180 (Hel.)
Sandground, J. H. (joint author), 453 (Hel.)
Sandosham, A. A., 507 (Misc. Pap.)
Sanghvi, L. D. (joint author), 1117 (Haem.)
Sankaran, A. N. (joint author), 859 (Def. Dis.)
Santoro, S. (joint author), 1355 (Tox.)
Sapero, J. J. (joint author), 512 (B.R.)
Sapkas, A. (joint author), (1352) (Haem.)
Sappenfield, R. (joint author), 39 (Am.)
Sapunar, J. (joint author), 1190 (Am.)
Sarauw, U. (joint author), 398 (Mal.)
Sardjito, M. & Soebekti, R., 827 (Ys.)
Sargent, F. & Slutsky, H. L., 1125 (Heat Str.)
Sarin, B. P., 1453 (Def. Dis.)
Sarin, J. C. (joint author), 93 (Misc. Dis.)
Sarkar, A. K. (joint author), 1189 (Chl.)
Sarrouy, C. & Clausse, J., 743 (Def. Dis.)
—— & Gillot, F., (408) (Leish.)
Sarton, B. (joint author), (702) (Lep.)
Sartorius, F., 563 (Rab.)
Sasa, M., Iimuro, I. & Miura, A., (277) (Typh.)
—— & Miura, A., 412, (670) (Typh.)
Sato, A. (joint author), 1109 (Hel.)
Sato, K. (joint author), 724 (Hel.)
Sato, S., 1197 (Lep.)
Satoskar, R. S. (joint author), 77 (Def. Dis.)
Satya Prakash (joint author), 397, 1152 (Mal.), (1062) (Tryp.)
Satyanarayanamurthi, G. V. & Brahmanandam, S., 474 (Haem.)
Sauberlich, H. E. (joint author), 860 (Def. Dis.)
Sautet, J., 805 (Typh.)
——, Aldighieri, R. & Vuillet, J., 1137 (Ent.)
——, Desanti, E., Vuillet, J., Arnaud, G. & Ausseil, M., 1159 (Mal.)
——, Gevaudan, P., Caporali, J. & Vuillet, J., 535 (Mal.)
——, Pastacaldi, V. & Vuillet, J., 793 (Mal.)
——, Vuillet, J. & Arnaud, G., 1158 (Mal.)
——, ——, —— & Ausseil, M., 1158 (Mal.)
—— (joint author), 1158 (Mal.)
Sawada, T., Hara, K., Takagi, K., Nagazawa, Y. & Oka, S., 454 (Hel.)
Saxena, K. C., Sagar, P., Agarwala, S. C. & Shrivastava, D. L., 1186 (Pl.)
Sayerse, C. (joint author), 203 (Def. Dis.)
Saz, H. J. & Hubbard, J. A., (985) (Hel.)
Sazonova, O. N., 231 (Parasit.)
—— (joint author), 231 (Parasit.)
Scatozza, F. (joint author), 811 (Rab.)
Scatterday, J. E. (joint author), 1406 (Rab.)
Schacher, J. F. & Danaraj, T. J., 1442 (Hel.)
—— (joint author), 1341 (Hel.)
Schack, J. A. (joint author), 292 *bis* (Am.)
Schaechter, M., Bozeman, F. M. & Smadel, J. E., 804 (Typh.)
Schaible, G., 171, 685 (Am.)
Schaller, K. F. (joint author), 1090 (Lep.)
Schenone, H. & Niedmann, G., 1064, 1300 (Tryp.)
——, ——, Bahamonde, L. & Bonnefoy, J., 1234 (Vms.)
—— (joint author), 1121 (Vms.)
Schiappacasse, E. (joint author), (753) (Tox.)
Schick, R., Ritterband, A. B. & Lieberman, A. H., 838 (Hel.)
Schiller, E. L. (joint author), 845 (Hel.)
Schimizzi, M. (joint author), (955) (Am.)
Schinazi, L. A., 1059 (Mal.)
—— & Ball, G. H., 795 (Mal.)
Schindler, R., 676 (Rab.)
Schlesinger, R. W., Gordon, I., Frankel, J. W., Winter, J. W., Patterson, P. R. & Dorrance, W. R., 419 (Den.)
Schmidt, F. R. *et al.*, 348 (Der.)
Schmidt, K. P. & Marx, H., 1026, 1027 (Ent.)
Schmidt, W. (joint author), 177 (Lep.)
Schmidtke, L., 1357 (Tox.)

Schneider, J., (434) (Am.), 972 (Hel.)
—— & Husson, R. A., 73 (Hel.)
——, Languillon, J. & Delas, A., 1386 (Mal.)
Schneider, M. D. & Radke, K. G., 1329 (Hel.)
—— (joint author), (973) (Hel.)
Schneider, N. J., Scatterday, J. E., Lewis, A. L., Jennings, W. L., Venters, H. D. & Hardy, A. V., 1406 (Rab.)
Schneider, R. G., 604 (Haem.)
—— & Genereaux, B. D., 342 (Haem.)
Schnitzer, R. J. & Grunberg, E., 1031 (B.R.)
Schoefield, R. A. (joint author), 605 (Haem.)
Schoental, R., 865 (Def. Dis.)
Schofield, F. D., 1226 (Haem.)
—— (joint author), 189 (Hel.), 1226 (Haem.)
Scholer, J. F. (joint author), 866 (Sp.)
Scholes, R. T. (joint author), 1221 (Def. Dis.)
Schöll, S., 941 (Typh.)
Scholz, D. A. (joint author), 471 (Sp.)
Schoof, H. F. & Kilpatrick, J. W., 765 (Ent.)
—— (joint author), 6 (Mal.), 98, 502, 765, 1137 (Ent.)
Schoop, G. & Kauker, E., 1380 (B.R.)
Schuhová, V., 753 (Tox.)
Schujman, S., 49 (Lep.)
Schulz, K. H. & Crutkhow, C., 286 (Pl.)
——, —— & Sitachitta, C., 1139 (Ent.)
Schumacher, H. H. (joint author), 1210 (Hel.)
Schwabe, C. W., (1111) *bis* (Hel.)
Schwartz, H. C., Spaet, T. H., Zuelzer, W. W., Neel, J. V., Robinson, A. R. & Kaufman, S. F., (869) (Haem.)
Schwartz, R., 470 (Def. Dis.)
—— & Dean, R. F. A., 1224 (Def. Dis.)
—— & Tuttle, W. B., 527 (Mal.)
Schwarz, J. (joint author), 353, 613 (Der.)
Schwetz, J., 707, 708, 1092, 1104 (Hel.)
——, Baumann, H. & Fort, M., 758 (Parasit.)
Scliar, G. (joint author), (1064) (Tryp.)
Scorza, J. V. & Dagert Boyer, C., 143 (Tryp.)
——, —— & Arocha, L. I., (611) (Tox.)
Scott, J. A. (joint author), 705 (Hel.)
Scott, K. G. (joint author), 759 (Ent.)
Scott, R. B. (joint author), 341 (Haem.)
Scremini Algorta, P. (joint author), 1439 (Hel.)
Scrimshaw, N. S., Béhar, M., Arroyave, G., Tejada, C. & Viteri, F., 1224 (Def. Dis.)
——, ——, ——, Viteri, F. & Tejada, C., 202 (Def. Dis.)
——, ——, Viteri, F., Arroyave, G. & Tejada, C., 861 (Def. Dis.)
—— (joint author), 196, 863, 1223 (Def. Dis.)
Sebastiani, G. (joint author), (589) (Hel.)
Seely, J. (joint author), 1410 (Pl.)
Seguin, F. (joint author), (208) (Haem.)
Seibold, H. R. (joint author), 44 (Am.)
Seijas O., O., (877) (Der.)
Seki, T. (joint author), 356 (Oph.)
Selloumi, H. F. (joint author), 738 (Def. Dis.)
Selye, H. & Bois, P., 619 (Misc. Dis.)
Semashko, L. L. (joint author), 555 (Typh.)
Semenova, E. L., Kartasheva, A. L., Abramova, G. F. & Lopatukhina, L. G., 1410 (Pl.)
Semple, A. B. (joint author), 735 (Hel.)
Sen, B. B. (joint author), 409 (Leish.)
Sen, N. R. (joint author), 299, 1089 (Lep.)
Sen, S. K. (joint author), 462 (Hel.)
Sendral, R. (joint author), (281) (Typh.)
Sénécal, J., Pille, G., Dupin, H., Sayerse, C. & Ospital, M. T., 203 (Def. Dis.)
——, ——, Vuylsteke, J., Dupin, H. & Aubry, L., 1453 (Def. Dis.)
Senevet, G., Andarelli, L., Duzer, A. & Lieutaud, A., 784 (Mal.)
——, —— & Lieutaud, A., (1018) (Ent.)
Senft, A. W. & Weller, T. H., 450 (Hel.)
Sen Gupta, G. P. (joint author), 397 (Mal.)
Sen Gupta, P. C., Chakravarty, N. K., Ray, H. N. & Das Gupta, B., 274 (Leish.)
Sepulcri, P. (joint author), 5 *bis* (Mal.)
Sergent, Ed., 825 (R.F.), 1142 (Misc. Pap.)
—— & Poncet, A., 12, 791, 926, 927 (Mal.)
—— & Sergent, Et., 7 (Mal.)
Sergent, Et. (joint author), 7 (Mal.)
Sérié, C., Ovazza, M. & Gutfreund, R., 668 (Typh.)
—— & Schaller, K. F., 1090 (Lep.)
Serrano, D. G. (joint author), 712 (Hel.)
Servadei, B. (joint author), 1317 (Am.)
Service, M. W. (joint author), 920 (Mal.)
Seth, R. K. (joint author), (618) (Misc. Dis.)
Setzer, H. W., (769), (892) (Ent.)
Severo, O. P., 25 (Y.F.)
Sewell, A. K. (joint author), 892 (Lab.)
Sewell, B. (joint author), 331 (Hel.)
Sezen, N., 790 (Mal.)
Shafei, A. Z., 172 (Am.)
Shah, S. N. (joint author), 302 (Hel.)
Shahgudian, E. R., (6) (Mal.)
Shama Sastry, H., Sitaraman, N. L. & Rama Rao, T. S., 649 (Mal.)
Shamir, R. (joint author), 88 (Oph.)
Sharma, G. K. (joint author), 399, 794 (Mal.)
Sharma, M. I. D. & Krishnamurthy, B. S., (1054), (1292) (Mal.)
—— (joint author), (766) (Ent.), 1070 (Y.F.)
Sharp, L. K. (joint author), (1416) (Am.)
Shaw, C., 425 (Chl.)
Shelton, D. F. (joint author), 29 (Rab.)
Shenoy, K. G. (joint author), 996 (Haem.)
Shepard, C. C., 297 (Lep.)
Sherman, E. J. (joint author), (1018) (Ent.)
Sherman, H. J. (joint author), 685, 686 (Am.)
Shesterikova, A. A. (joint author), 642 (Mal.)
Sheth, U. K., Kekre, M. S. & Lewis, R. A., 186 (Hel.)
—— (joint author), 1353 (Vms.)
Shevelev, A. S., 944 (Typh.)
Shields, T. L. & Walsh, E. N., 346 (Der.)
Shigemi, M., 842 (Hel.)
Shimada, T. (joint author), 285 (Pl.), (500) (Ent.)
Shluger, E. G. (joint author), 231 (Parasit.)
Short, G. M. (joint author), 1420 (Lep.)
Shrivastava, D. L. (joint author), 32, 423, 1186 *bis* (Pl.)
Shukla, R. N. & Parande, A. S., (475) (Haem.)
Shukri, N. (joint author), 970 (Hel.)
Shute, G. T. (joint author), 392 (Mal.)
Shute, P. G. (joint author), 110 (B.R.)
Shuttleworth, J. S., 581 (Lep.)
Šibalic, S. (joint author), 469 *bis* (Def. Dis.)
Sibbing, W. (joint author), 1380 (B.R.)
Sibthorpe, E. M., 878 (Misc. Dis.)
Sicart, M., (4) (Mal.)
Siennicki, W., 150 (Typh.)
Siim, J. C., 477 (Tox.)
Sikora, H., 941 (Typh.)

Silich, V. A. (joint author), 555 (Typh.)
Silva, M. A. de Andrade, (404) (Tryp.), 1028 (Reports, etc.)
Silva, R. (joint author), 588 (Hel.)
Silva, Y. (joint author), 588 (Hel.)
Silva-Goytia, R. & Calero M., C., 279 (Typh.)
Silver, H. K., Simon, J. L. & Clement, D. H., 1460 (Haem.)
Silvestroni, E. & Bianco, I., (605), 1117, 1228 (Haem.)
Simič, Č., 780 (Mal.)
Simitch, T., Petrovitch, Z. & Bordjochki, A., 219, 876 (Tox.)
——, ——, —— & Pop-Cenitch, S., 1238 (Tox.)
——, Ramsine, S., Petrovitch, Z., Chibalitch, D. & Jankov, L., 432 (Am.)
—— & Zivkovitch, V., 665 (Leish.)
Simizu, E. (joint author), 87 (Oph.)
Simon, J. L. (joint author), 1460 (Haem.)
Simond, M. (joint author), 760 (Ent.)
Simpkiss, M. J. (joint author), 1347 (Def. Dis.)
Simpson, E. J. B., 1112 (Hel.)
Simpson, I. A. & Chow, A. Y., 200 (Def. Dis.)
Singer, K., Josephson, A. M., Singer, L., Heller, P. & Zimmerman, H. J., 1351 (Haem.)
Singer, L. (joint author), 1351 (Haem.)
Singh, A. & Jolly, S. S., 844 (Hel.)
——, Prakash, C. & Balasubrahmanyan, M., (1246) (Misc. Dis.)
Singh, K. R. P. & Micks, D. W., 1474 (Ent.)
Singh, M. V. (joint author), 126 (Mal.)
Singh, N. N. (joint author), 1054 (Mal.)
Singh, R. B. (joint author), 212 (Haem.)
Singh, R. C. (joint author), 1246 (Misc. Dis.)
Sirsi, M. (joint author), 132, 399, 535 (Mal.)
Sisiruca, C. (joint author), 1196 (Lep.)
Sitachitta, C. (joint author), 1139 (Ent.)
Sitaraman, N. L. (joint author), 533, 649 (Mal.)
Skewes, E. (joint author), (753) (Tox.)
Skinner, M. (joint author), 863 (Def. Dis.)
Škrabalo, Z. & Deanović, Ž., 757 (Parasit.)
Slade, P. R., Haseeb, M. A. & Morgan, H. V., 350 (Der.)
Sliwensky, M., 1130 (Misc. Dis.)
Slutsky, H. L. (joint author), 1125 (Heat Str.)
Smadel, J. E. (joint author), 411, 804 (Typh.)
Smaka, R. S. & Capp, A. B., 1090, 1091 (Lep.)
Smalley, H. E. (joint author), 61 (Hel.)
Smallman, B. N. (joint author), (96), 1476 (Ent.)
Smart, J., 512 (B.R.)
Smedley, S. R., 166 (Am.)
Smith, A., 237 (Ent.), 1283 (Mal.)
—— (joint author), 917 (Mal.)
Smith, A. N. (joint author), 873 (Haem.)
Smith, C. A., (1419) (Ys.)
Smith, C. C. & Ihrig, J., 1048 (Mal.)
Smith, C. E. (joint author), 222, 351 (Der.)
Smith, C. E. G., 25, 161, 418, 1312 (Den.), 508 (Misc. Pap.)
Smith, C. H., (474) (Haem.)
Smith, C. N., 629 (Ent.)
—— (joint author), 504, 1250 (Ent.)
Smith, C. S. (joint author), 608 (Tox.)
Smith, D. A. (joint author), 602 (Haem.)
Smith, E. P. (joint author), 191 (Def. Dis.)
Smith, G. E., 266 (Mal.)
—— (joint author), 643 (Mal.)
Smith, G. F., Geib, A. F. & Isaak, L. W., (502) (Ent.)
Smith, G. K. A. (joint author), 545 (Tryp.)
Smith, H. C., (217) (Tox.)
Smith, K. M. (joint author), 416 (Typh.)
Smith, M. (joint author), 1421 *bis* (Lep.)
Smith, N. M. (joint author), 336 (Sp.)
Smith, P. N., McCamish, J., Seely, J. & Cooke, G. M., 1410 (Pl.)
Smith, R. F. (joint author), 759 (Ent.)
Smith, S. A., 361 (Ent.)
Smith, W. W. & Love, G. J., 761 (Ent.)
—— (joint author), 1017 (Ent.), 1066 (Typh.)
Smogorzhevskaya, L. A., 232 (Parasit.)
—— (joint author), 231 (Parasit.)
Snodgrass, P. J., 21 (Typh.)
Snow, G. A. & Hurst, E. W., (1290) (Mal.)
Snow, W. E., Pickard, E. & Moore, J. B., (888) (Ent.)
—— & Smith, G. E., 643 (Mal.)
Snyder, J. C. (joint author), 512 (B.R.)
Soap, New York, (891) *quin*, (892) (Ent.)
Soares, A. C., 704 (Lep.)
Soares, R. (joint author), (1291) (Mal.)
Soares, R. de R. L. (joint author), 312 *bis* (Hel.)
Soberón y Parra, G., (1048) (Mal.)
Soběslavský, O., 1401 (Typh.)
—— (joint author), 24, 280 (Typh.)
Sobky, M. F., 787 (Mal.)
Soebekti, R. (joint author), 827 (Ys.)
Soedarsono, H. (joint author), 689 (Ys.)
Soeparmo, H. T. (joint author), 790 (Mal.)
Soetopo, M., Wasito, R., Soedarsono, H. & Tjokrodipo, D., 689 (Ys.)
Şofletea, A. (joint author), 529 (Mal.)
Solomon, P. (joint author), 179 (Hel.)
Solomon, W. (joint author), 1431 (Hel.)
Somerset, E. J. & Sen, N. R., 299 (Lep.)
Somova, A. G. & Gerasyuk, L. G., 558 (Typh.)
Song, Y. S., 1349 (Haem.)
Soresçu, A., Panaitescu, D., Solomon, P., Hacig, A. & Bellu, C., 179 (Hel.)
Soto, R. A. (joint author), (1346) (Def. Dis.)
Sourander, P., 282 (Rab.)
South Pacific Commission, 68, 726, 1214, 1444 (Hel.), (1346) (Def. Dis.)
Southcott, R. V., 344 (Vms.)
Souza, R. de P., Bechelli, L. M., Ferraz, N. de T. & Quagliato, R., 446 (Lep.)
—— (joint author), 446 (Lep.)
Soysal, S. S. (joint author), 799 (Leish.)
Spaet, T. H. (joint author), (869) (Haem.)
Sparrow, H., 436 (R.F.)
Speck, R. S. & Wolochow, H., 815 (Pl.)
—— (joint author), 815 (Pl.)
Spencer, M. (joint author), 1045 (Mal.)
Spencer, T. E. T., Spencer, M., Jemesen, M. T. & Tommerup, J. W. J., 1045 (Mal.)
Spielman, A., 1248 (Ent.)
Spingarn, C. L., Edelman, M. H., Gold, T., Yarnis, H. & Turell, R., 712 (Hel.)
Spitz, U. (joint author), 1241 (Der.)
Spooner, D. F. (joint author), 930 (Tryp.), 1236 (Tox.)
Spray, G. H., 473 (Haem.)
Spudis, V. K., 1384 (Mal.)
Squire, F.A. (joint author), (143) *bis*, (932) (Tryp.)
Srikantan, T. N., Agarwala, S. C. & Shrivastava, D. L., 1186 (Pl.)
Sriramachari, S. (joint author), 742 (Def. Dis.)
Srivastava, J. R. 756 (Misc. Dis.)

Srulevich, S. (joint author), 22, 415 (Typh.)
Staelfen, J. (joint author), (819) (Am.)
Stahnke, H. L., Allen, F. M., Horan, R. V. & Tenery, J. H., 1119 (Vms.)
Stallones, R. A., Gauld, R. L., Dodge, H. J. & Lammers, T. F. M., 1363 (Heat Str.)
Stam, A. B. & Van Thiel, P. H., 43 (Am.)
Stamm, W. P., 1242 (Heat Str.), 1414 *bis* (Am.)
Standen, H. (joint author), 266 (Mal.)
Standen, O. D. & Walls, L. P., 313 (Hel.)
—— (joint author), 313, 1431 (Hel.)
Standfast, H. (joint author), 1383 (Mal.)
Stanier, M. W. (joint author), 197 (Def. Dis.)
Stark, H. E., (1186) (Pl.)
Starke, G., 27, 951 (Rab.)
Starkoff, O., (242) (Ent.), 574 (R.F.)
Stary, Z. (joint author), 799 (Leish.)
Staub, A. M. (joint author), 1471 (Misc. Dis.)
Stein, H., 1246 (Misc. Dis.)
—— (joint author), 600 (Def. Dis.)
Stein, Y. (joint author), 866 (Haem.)
Steiner, J. O. (joint author), 1394 (Tryp.)
Steinhaus, E. A. & Smith, R. F., 759 (Ent.)
Stephen, A., 1369 (Ent.)
Stephen, J. M. L. (joint author), 1456 (Def. Dis.)
Sterckx, P. (joint author), 923 (Mal.)
Sterenberg, H. (joint author), 688 (Ys.)
Sterkhova, N. N. & Mirzoeva, N. M., 554 (Typh.)
Sternburg, J. & Kearns, C. W., 362 (Ent.)
Steyskal, G. C., 886 (Ent.)
Stijns, J. & Charles, P., 867 (Haem.)
Stillerman, M., 1005 (Tox.)
Stimmel, C. & Scott, J. A., 705 (Hel.)
Ştirbu, A. (joint author), 163 (Rab.)
Stirewalt, M. A., 838 (Hel.)
—— (joint author), 839 (Hel.)
Stojałowska, W. & Moniuszko, A., 623 (Parasit.)
Stojković, L. (joint author), (945) (Typh.)
Stoker, M. G. P., 671 (Typh.)
——, Smith, K. M. & Fiset, P., 416 (Typh.)
—— (joint author), 414 (Typh.)
Stolze, E. (joint author), 298 (Lep.), 309 (Hel.)
Story, P. (joint author), 1001 (Haem.)
Stransky, E. & Reyes, A., 65, 315 (Hel.)
Straub, M. & Schwarz, J., 353, 613 (Der.)
Strode, G. K., Whayne, T. F., Williams, L. L., Jr., Sapero, J. J. & Snyder, J. C., 512 (B.R.)
Strom, L. G. (joint author), 1404 (Y.F.)
Strome, C. P. A. (joint author), 624 (Parasit.)
Stuart, K. L. & Bras, G., 77 (Def. Dis.)
Stünzi, H. (joint author), (94) (Parasit.)
Sturgeon, P. & Finch, C. A., 606 (Haem.)
Subrahmanian, M. V. (joint author), (1307) (Typh.)
Subrahmanyan, V. (joint author), 859 (Def. Dis.)
Subramanyam, N. T. (joint author), 588 (Hel.)
Suckling, P. V. & Campbell, J. A. H., 865 (Def. Dis.)
Suitor, E. C., Jr. (joint author), 940 (Typh.)
Sujudi (joint author), 223 (Oph.)
Sukatǫn, R. U. (joint author), 357 (Misc. Dis.)
Sukumaran, P. K. (joint author), 1117 (Haem.)
Sullivan, W. N. (joint author), 1475 (Ent.)
Summers, W. A., 1124 (Tox.)
Sureau, P. (joint author), 879 (Misc. Dis.)
Surendranathan, R. (joint author), 1215 (Hel.)
Surgalla, M. J. (joint author), 816 (Pl.)
Sushida, K. (joint author), 836 (Lep.)
Sutorisová-Stolzová, M. & Georch, D., 668 (Typh.)
Suyemoto, W., Wheeler, C. M., Cavanaugh, D. C., Yamakawa, Y. & Shimada, T., 285 (Pl.)
Suzacq, C. V. (joint author), 1439 (Hel.)
Suzuki, H. (joint author), (323) (Hel.)
Suzuki, T. (joint author), 152, 153 (Typh.)
Svensson, R., 359 (Parasit.)
Swaroop, S. & Grab, B., 899 (B.R.)
Sweeney, W. M., Crippen, D. A., Christianson, J. F. & Cooke, L. B., Jr., (605) (Haem.)
Swellengrebel, N. H., 358 (Parasit.)
—— & Kraan, H., 1050 (Mal.)
Swerts, L., 1322 (Lep.)
Symes, C. B. (joint author), 1340 (Hel.)
Symmers, W. St. C., 1218 (Hel.)
Symonds, B., 468 (Def. Dis.)
—— & Mohammed, I., 742 (Def. Dis.)
Syrkina-Kruglak, S. A., 654 (Mal.)
Syrůček, L. & Raška, K., 557 (Typh.), 1268 (Reports, etc.)
—— & Soběslavský, O., 24 (Typh.)
—— (joint author), 280, 672 (Typh.)

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Táborská, D. (joint author), 674 (Typh.)
Tachikawa, N. (joint author), 442 (Lep.)
Tacticos, G. (joint author), (615) (Oph.)
Tagle, I., Rivera, G. & Neghme, A., 460 (Hel.)
Taindel, C. (joint author), 163 (Rab.)
Takagi, K., 590 (Hel.)
—— (joint author), 454 (Hel.)
Takahasi, H. (joint author), 87 (Oph.)
Takigami, T., Kawamura, A., Jr., Nishioka, K. & Iida, H., 277 (Typh.)
Talarmin (joint author), 452 (Hel.)
Talibi, S. A. (joint author), 1047 (Mal.)
Tamaki, A. (joint author), 803 (Typh.)
Tanabe, H. (joint author), 457 (Hel.)
Tanaka, K. (joint author), 1361 (Oph.)
Tanaka, K. R., Clifford, G. O. & Axelrod, A. R., 341 (Haem.)
Taneja, P. N. & Seth, R. K., (618) (Misc. Dis.)
T'Ang, C. H. (joint author), 323 (Hel.)
Tanimura, T., Honda, H. & Oshima, T., 1193 (Lep.)
Tanner, R. E. S., 332 (Def. Dis.)
T'Ao, S. C., 1206 (Hel.)
Tapu, J. (joint author), 67 (Hel.)
Tarabini (joint author), 701 (Lep.)
Tarasevich, I. V. (joint author), 553, 555 (Typh.)
Tarnay, T. J., Yardley, J. M., Guicherit, I. D. & Brown, H. W., 1110 (Hel.)
Tarshis, I. B., (1374) (Ent.)
Tashima, H. (joint author), 1361 (Oph.)
Tasker, P. W. G., 206 (Haem.)
Tasque, P. (joint author), 670, (1069) (Typh.)
Tatum, A. L. (joint author), 536 (Mal.)
Taub, J., 410 (Leish.)
Taufflieb, R., 733 (Hel.)
—— & Finelle, P., 1022 (Ent.)
Tawara, J., 817 (Chl.)
Taylor, A. E. R., 1160 (Mal.)
Taylor, E. P. (joint author), 545 (Tryp.)
Taylor, J., 747 (Vms.)
Taylor, W. N., 900 (B.R.)
Tchakmakov, A., 388 (Mal.)

Tch'en, K. L. (joint author), 587 (Hel.)
Tecce, N. & Villari, A., 1473 (Parasit.)
Teesdale, C., 1310 (Y.F.)
Teixeira, I. (joint author), 1465 (Tox.)
Tejada, C. & Russfield, A. B., 1455 (Def. Dis.)
—— (joint author), 202, 861, 1224 (Def. Dis.)
Tellem, M., Rubenstone, A. I. & Frumin, A. M., 998 (Haem.)
Tempelis, C. H. & Lysenko, M. G., 823 (Am.)
Tenery, J. H. (joint author), 1119 (Vms.)
Ten Seldam, R. E. J. (joint author), 360 (Parasit.)
Terada, H., Watanabe, S. & Tamaki, A., 803 (Typh.)
Terencio (joint author), 701 (Lep.)
Tereshchenko, M. N., 1268 (Reports, etc.)
Teriteanu, E. (joint author), 529 (Mal.)
Terry, R. J., 1298 (Tryp.)
—— (joint author), 792 (Mal.)
Terzin, A. L. & Gaon, J., 552 (Typh.)
Tettey, C. (joint author), (1142) (Misc. Pap.)
Teuscher, E. & Stünzi, H., (94) (Parasit.)
Teyssandier, M. J., 303 (Hel.)
Thaineua, M. (joint author), 1186 (Pl.)
Thalhammer, O. (joint author), 1358 (Tox.)
Theiler, M. (joint author), 26 (Den.)
Thein, H. (joint author), 1001 (Haem.)
Theron, J. J. & Meyer, B. J., 1227 (Haem.)
Thévenet, A. (joint author), (321) (Hel.)
Thevenot, C. (joint author), (321) (Hel.)
Thiel, J. (joint author), 1065 (Leish.)
Thiermann, E. (joint author), 479 (Tox.)
Thiery, G. (joint author), 1454 (Def. Dis.)
Thijs, A., 1363, (1367) (Misc. Dis.)
Thillet, C. J., Jr. & Chandler, A. C., 1164 (Tryp.)
Thomas, J. (joint author), 1454 (Def. Dis.)
Thomas, R. C. (joint author), 1309 (Typh.)
Thomas, T. C. E., 627 (Ent.)
Thomason, B. M., Moody, M. D. & Goldman, M., 492 (Misc. Dis.)
—— (joint author), 492 (Misc. Dis.)
Thompson, B. W. (joint author), 243 (Ent.)
Thompson, D. (joint author), 80 (Haem.)
Thompson, J. H., 593 (Hel.)
Thompson, R. B., 1116 (Haem.)
Thomson, I. G., 228 (Ulc.), 333 (Def. Dis.)
Thomson, J. (joint author), 882 (Parasit.)
Thomson, M. L., 1242 (Heat Str.)
Thooris, G. C., 71, 72 (Hel.)
——, Heuls, J., Kessel, J. F., L'Hoiry & Bambridge, B., 850 (Hel.)
—— (joint author). 67 (Hel.)
Thorson, R. E., (322) (Hel.)
——, Seibold, H. R. & Bailey, W. S., 44 (Am.)
Thymakis, K. (joint author), 919, 1052 (Mal.)
Thys, A. (joint author), 483 (Der.)
Tiburskaya, N. A., 645, 923, 1291 (Mal.)
Tigano, F. (joint author), 1317 (Am.)
Ting, K. S. (joint author), 455 *bis*, 456, 1207, 1208 *bis* (Hel.)
Tjalma, R. A. & Wentworth, B. B., (563) (Rab.)
Tjokrodipo, D. (joint author), 689 (Ys.)
Tobie, E. J. & Highman, B., 141 (Tryp.)
Todorović, K., 664 (Leish.)
Todorović, S. & Popović, D., 837 (Hel.)
Tokumo, S., 968 (Hel.)
Tolentino, P. & Bucalossi, A., 108 (B.R.)
Tommerup, J. W. J. (joint author), 1045 (Mal.)
Tonpi, K. V. (joint author), 1409 (Pl.)
Torfeh, H., 88 (Oph.)
Torrealba, A. I. (joint author), 209 (Haem.)
Torrealba, I. (joint author), 209 (Haem.)
Torrealba, J. F., 210 (Haem.)
——, Vázquez, A. D., Rodríguez, I. R., González, D. & Torrealba, A. I., 209 (Haem.)
——, ——, —— & Torrealba, I., 209 (Haem.)
Torroella, J. (joint author), 1359, 1464 (Tox.)
Torsuev, N. A., 438 (Lep.)
Toshioka, S. (joint author), (500) (Ent.)
Toumanoff, C. & Simond, M., 760 (Ent.)
Toury, J. (joint author), (1222) (Def. Dis.)
Trager, W., 386 (Mal.)
Trans. Roy. Soc. Trop. Med. & Hyg., 1121 (Tox.), 1414 (Am.)
Trapido, H. & Galindo, P., 1070 (Y.F.)
—— (joint author), 674, 1071 (Y.F.)
Traub, R. & Hoogstraal, H., 1026 (Ent.)
Tredre, R. F., 248 (B.R.), 1225 (Haem.)
Trimble, A. P., 306 (Hel.)
Trimble, J. R. & Doucette, J., 223 (Der.)
Trincão, C., Nogueira, A. R. & De Almeida Franco, L. T., 270 (Tryp.)
——, Pinto, A. R., Franco, A. & Nogueira, A., 271 (Tryp.)
Trinidad Govt., 129 (Mal.)
Troelstra, J. A. & Voûte, A. D., 323 (Hel.)
Trowell, H. C. & Simpkiss, M. J., 1347 (Def. Dis.)
—— & Vaizey, J. M., 538 (Bl.)
Ts'ai, Y. H. (joint author), 1105 (Hel.)
Tsang, K. C. (joint author), 229 (Misc. Dis.)
Tsen, Y. L., Chu, C. C., Chih, C. C., Liang, Y. I. & Ting, K. S., 455 (Hel.)
—— (joint author), 455, 456, 1207, 1208 *bis* (Hel.)
Tseng, P. T., Chen, H. H. & Pletsch, D. J., 1288 (Mal.)
—— (joint author), 730 (Hel.), 1288 (Mal.), 1373 (Ent.)
Tsuchiya, H. (joint author), 878, (878) (Oph.)
Tsuno, K. (joint author), 734 (Hel.)
Tung, T. C. (joint author), 201 (Def. Dis.), 587 (Hel.)
Turell, R. (joint author), 712 (Hel.)
Turner, J. C., (215) (Vms.)
Tuttle, W. B. (joint author), 527 (Mal.)
Tweedie, M. W. F. & Reid, H. A., 82 (Vms.)
Twohy, D. W. & Rozeboom, L. E., 1249 (Ent.)
Tyrrell, D. (joint author), 217 (Tox.)

U

Udani, P. M., (84) (Tox.)
Ueno, H., Simizu, E., Goto, T. & Takahasi, H., 87 (Oph.)
Ugarriza, R. G., 47 (Lep.)
United States Dept. of Agriculture, (1368) (Parasit.)
Urbach, H., 945 (Typh.)
Urquhart, G. M. (joint author), 182 (Hel.)
Uspensky, S. M. (joint author), 989 (Hel.)
Uyeno, H. (joint author), 1361 (Oph.)

V

Vaidyanathan, N. & Rao, P. V., 392 (Mal.)
Vaizey, J. M. (joint author), 538 (Bl.)
Vajic, B., Šibalic, S. & Naumovic, M., 469 (Def. Dis.)
——, —— & Radej, N., 469 (Def. Dis.)

Valenta, V., 1268 (Reports, etc.)
Valentinčič, M., 493 (Parasit.)
Valentino, L., 430 (Am.)
Valette, A., 1199 (Lep.)
Valhuerdi Fernández, C. (joint author), 966 (Lep.)
Van Assendelft, F., Miller, J. W., Mintz, D. T., Schack, J. A., Ottolenghi, P. & Most, H., 292 (Am.)
—— (joint author), 292 (Am.)
Van Bogaert, L., 931 (Tryp.)
—— & Dubois, A., 796 (Tryp.)
—— (joint author), 402 (Tryp.)
Vanbreuseghem, R., 482 (Der.)
——, Courtois, C., Thys, A. & Doupagne, P., 483 (Der.)
Van Deinse, A. B., 1106 (Hel.)
Van den Berghe, L., 135 (Tryp.)
—— & Lambrecht, F. L., 139 *bis*, 141 (Tryp.)
Vandepitte, J., 342 (Haem.)
——, Beeckmans, G. & Ninane, J., 481 (Der.)
—— (joint author), 980 (Hel.)
Van der Hoeven, J. A., 201 *bis* (Def. Dis.)
Van Der Kuyp, E., 893 (Reports, etc.)
Van der Meulen, G. & Melen, G., 1198 (Lep.)
Vander Ploeg, D. E. (joint author), 1154 (Mal.)
Van der Sar, A. (joint author), 207 (Haem.)
Van der Waaij, D. (joint author), 609 (Tox.)
Van der Walle, N., (1069) (Bart.)
Vande Voorde, R. R., 1024 (Ent.)
Vandot, S. (joint author), 95 (Parasit.)
Van Droogenbroeck, J. B. A., 1083 (Am.)
Van Gool, J. (joint author), 1232 (Haem.)
Van Harreveld, A. (joint author), (874) (Vms.)
Van Laer (joint author), 923 (Mal.)
Van Oye, E. & Charles, P., 1452 (Def. Dis.)
Van Rootselaar, F. J., 1085 (Ys.)
Van Soestbergen, A. A., 345 (Tox.)
Van Someren, E. C. C. (joint author), 763 (Ent.)
Van Thiel, P. H., 344, 345 (Tox.), 1217 (Hel.)
—— & Van der Waaij, D., 609 (Tox.)
—— (joint author), 43 (Am.)
Van Zanten, E. (joint author), 1423 (Lep.)
Varela, G., 216 (Tox.)
——, Roch, E. & Palencia, L., 216 (Tox.)
——, —— & Torroella, J., 1464 (Tox.)
——, Vázquez, A. & Torroella, J., 1359 (Tox.)
Vargas, L., 236, (241), 363 (Ent.)
——, Díaz Nájera, A., Román, G., & Almaraz, A., 1055 (Mal.)
Vargas V., M., 361 (Ent.)
Varma, S. R., 1065 (Leish.)
Vasina, S. G., 537 (Mal.)
Vaucel, M., 636 (B.R.), (1376) (Misc. Pap.)
Vázquez, A. (joint author), 1359 (Tox.)
Vázquez, A. D. (joint author), 209 *bis* (Haem.)
Vázquez, J. (joint author), 199, 333 (Def. Dis.)
Vedamanikkam, J. C. (joint author), 126 (Mal.)
Velarde Thomé, J. (joint author), 961 (Ys.)
Vella, F., (603) (Haem.)
Veloso, H. P., De Moura, J. V. & Klein, R. M., 1385 (Mal.)
——, Fontana, P., Jr., Klein, R. M. & De Siqueira-Jaccoud, R. J., 262 (Mal.)
Venkat Rao, V. (joint author), 782 (Mal.)
Venkatachalam, P. S. & Ivinskis, V., 861 (Def. Dis.)
Venters, H. D. (joint author), 1406 (Rab.)
Verain, A. & Verain, A., 537 (Mal.)
——, —— & Le Filliatre, M., 933 (Tryp.)
—— (joint author), 537 (Mal.), 933 (Tryp.)
Verano, O. T. (joint author), 407, (933) (Tryp.)
Vermeil, C., 17 (Leish.), 57, 1102 (Hel.), 220 (Tox.)
Vertut, J. (joint author), (321) (Hel.)
Viera, O. (joint author), 22, 415 (Typh.)
Villa, M. E. (joint author), 1453 (Def. Dis.)
Villamil, C. F. (joint author), 44 (Am.)
Villari, A. (joint author), 1473 (Parasit.)
Villela, A. M. (joint author), 1444 (Hel.)
Villela, G. G. (joint author), (83) (Vms.)
Villela, J. B. (joint author), 856 (Hel.)
Vincent, P. (joint author), 167 (Am.), (321) (Hel.)
Vincke, I. H., 787 (Mal.)
Vinke, B. & Van der Sar, A., 207 (Haem.)
Violet, P. (joint author), 762 (Ent.)
Violovich, N. A., 231 (Parasit.)
Visconti, P., (718) (Hel.)
Viteri, F. (joint author), 202, 861, 863, 1224 (Def. Dis.)
Vogel, H. & Schumacher, H. H., 1210 (Hel.)
——, Widelock, D. & Fuerst, H. T., 857 (Hel.)
Vogelsang, T. M., 965 (Lep.)
Volgin, V. I., 231 (Parasit.)
Von Brand, T., (1134) (Parasit.)
—— (joint author), 1392 (Mal.)
Voors, A. W., 1220 (Def. Dis.)
Vorder Bruegge, C. F. (joint author), 999 (Haem.)
Voûte, A. D., 322 (Hel.)
—— (joint author), 323 (Hel.)
Vuillet, J. (joint author), 535, 793, 1158 *ter*, 1159 (Mal.), 1137 (Ent.)
Vukasović, P., Borjanović, S. & Martinović, A., 766 (Ent.)
Vuksić, L., Arsić, B., Mel, D., Morelj, M., Gerbec, M., Milovanović, M., Stojković, L., Mirković, M. & Milivojević, M., (945) (Typh.)
Vuylsteke, J. (joint author), 1453 (Def. Dis.)
Vysotskaya, S. O. & Sazonova, O. N., 231 (Parasit.)
—— & Shluger, E. G., 231 (Parasit.)

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Waddy, B. B., 106 *bis* (Reports, etc.)
Wade, H. W., 1195 (Lep.)
Wadsworth, G. R. & Lee, T. S., 471 (Haem.)
Wagle, M. M. (joint author), 77 (Def. Dis.)
Wagner, O. (joint author), (826) (R.F.)
Wainwright, J., 1132 (Misc. Dis.), 1333 (Hel.)
Walker, A. R. P., 205 (Haem.)
—— (joint author), 993 (Def. Dis.)
Wallis, R. C. (joint author), 500 (Ent.)
—— & Lang, C. A., (763) (Ent.)
Walls, L. P. (joint author), 313, 1431 (Hel.)
Walsh, E. N. (joint author), 346 (Der.)
Walters, J. H., 1121 (Tox.), 1242 (Heat Str.), 1414 (Am.)
—— & Bruce-Chwatt, L. J., 119 (Mal.)
—— & Lehmann, H., 211 (Haem.)
—— & Zahra, A., 1417 (Ys.)
—— (joint author), 389 (Mal.)
Wang, C. (joint author), 587 (Hel.)
Wang, C. L. (joint author), 587 (Hel.)
Wang, H. C., T'Ang, C. H., Liu, H. H. & Kao, H. M., 323 (Hel.)
—— (joint author), 1213 (Hel.)

Wang, S. P., 1313 (Rab.)
Wang, T. H. (joint author), 1213 (Hel.)
Wanson, M., 327 (Hel.)
Warburg, M., 13 (Mal.)
Wardekar, R. V., 47 (Lep.)
Warden, H. D. (joint author), (1082) (Am.)
Warner, B. W., 1099 (Hel.)
Warren, J. (joint author), 220 (Tox.)
Warren, L. O. (joint author), 1140 (Ent.)
Warsa, R. (joint author), 223 (Oph.)
Wartena, B., 383 (Mal.)
Wasito, R. (joint author), 689 (Ys.)
Wasserman, L., Gavriliță, L., Mărculescu, T., Chipail, A. & Pătrășcanu, V., 479 (Tox.)
Wassif, K., (768) (Ent.)
—— & Hoogstraal, H., (769) (Ent.)
—— (joint author), 1026 *bis* (Ent.)
Watanabe, H., 1206 (Hel.)
Watanabe, S., (1068) (Typh.)
—— (joint author), 803 (Typh.)
Waterlow, J. C., 743 (Def. Dis.)
—— & Bras, G., 1222 (Def. Dis.)
——, —— & DePass, E., 862 (Def. Dis.)
—— & Scrimshaw, N. S., 1223 (Def. Dis.)
—— & Stephen, J. M. L., 1456 (Def. Dis.)
—— & Weisz, T., 77 (Def. Dis.)
—— (joint author), 468 (Def. Dis.)
Watkins, E. S. (joint author), 89 (Heat Str.)
Watson, J. M., 449, 1096 (Hel.)
—— & Al-Hafidh, R., 984 (Hel.)
——, Balikian, G. & Abdel Kerim, R., 494 (Parasit.)
—— & Najim, A. T., 450 (Hel.)
Watson, K. C. & Laurie, W., 183 (Hel.)
Watson, W., 469 (Def. Dis.)
Wattal, B. L. (joint author), (1135) (Ent.), 1287 (Mal.)
Wawrzyński, E., Dzięciołowski, Z. & Kuźmicki, R., 573 (Am.)
Wayburne, S. (joint author), 1223 (Def. Dis.)
Webb, J. E., Jr. & Graham, H. M., 241 (Ent.)
Webb, J. K. G. (joint author), 1471 (Misc. Dis.)
Webster, B. H., 823 (Am.)
Weiner, J. S., 1242 (Heat Str.)
—— (joint author), 227 (Heat Str.)
Weiner, L. M. (joint author), 736 (Hel.)
Weinman, D. & Chandler, A. H., 215 (Tox.)
Weinstein, P. P. (joint author), 856, 857 *bis* (Hel.)
Weiss, E., Dressler, H. R. & Suitor, E. C., Jr., 940 (Typh.)
—— & Pietryk, H. C., 23 (Typh.)
Weisz, T. (joint author), 77 (Def. Dis.)
Weitz, B., 919 (Mal.)
—— & Glasgow, J. P., 400 (Tryp.)
—— (joint author), 498 (Ent.)
Wellensiek, U. (joint author), 1380 (B.R.)
Weller, T. H. (joint author), 450 (Hel.), 1236 (Tox.)
Wells, C. W., 508 (Misc. Pap.)
Wells, K. F., 1176 (Rab.)
Wells, R., 954 (Am.)
Wells, R. M. (joint author), 1325 (Hel.)
Wells, W. H., 495 (Parasit.)
Weng, H. C. (joint author), 181, 317 (Hel.)
Went, L. N. & MacIver, J. E., 869 (Haem.)
Wentworth, B. B. (joint author), (563) (Rab.), 945 (Typh.)
Werner, H., 396 (Mal.)
—— (joint author), 1056 (Mal.)
Wespi, H., (417) (Typh.)
West African Institute for Trypanosomiasis Research, 132 (Tryp.)
Weston, J. K. (joint author), 820, 821 (Am.)
Westphal, A., 1319 (Am.)
Weyer, F., 116 (Mal.)
—— & Hornbostel, H., 1066 (Typh.)
—— & Mooser, H., 824 (R.F.)
—— (joint author), 45 (R.F.), 1024 (Ent.)
Wharton, R. H. (joint author), 127 (Mal.)
Whayne, T. F. (joint author), 512 (B.R.)
Wheate, H. W., 1321, 1421 (Lep.)
Wheeler, C. E. (joint author), 805 (Typh.)
Wheeler, C. M. (joint author), 239, (500) (Ent.), 285 (Pl.)
Whittemore, F. W., Jr., 20 (Typh.)
Whittick, R. J., 512 (B.R.)
Whittow, G. C., 1143 (Misc. Pap.)
Wiadomości Parazytologiczne, 492 (Parasit.)
Widelock, D. (joint author), 857 (Hel.)
Wiener, S., 83 (Vms.)
Wiesmann, R., (506) (Ent.)
Wigand, R., (158) *bis* (Bart.)
Wigglesworth, V. B., 1482 (B.R.)
—— (joint author), (548) (Tryp.)
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